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THE NEW SCIENCE OF GEOGRAPHY*

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Geography, although perhaps the oldest of the sciences, has changed so completely in recent years that its true nature is not commonly understood, especially in America. Like every other science, it includes three phases or stages, each of which is characterized by a special mental process. The first, or empirical stage, is concerned merely with the gathering of a great body of unrelated facts. In the second, or systematic stage, these facts are classified and arranged in definite categories; while the third, or explanatory stage, is devoted to the explanation of the facts and to the determination of the laws which govern them. To these may be added the predictive stage, in which the laws of the explanatory stage are used to predict future occurrence; but with this we are not now concerned.

No one of the later stages can exist without all its predecessors, and in a mature science the processes of gathering, systematizing, and explaining go on side by side. For example, students of botany fall into three categories: plant-gatherers, whose chief joy is to find a new fern or alga; systematists, who laboriously describe and classify what others find; and true botanists, who use the work of their co-laborers as the basis for the discovery of new laws or of new applications of old laws.

The degree of interest possessed by these various stages varies greatly in different sciences. In most branches of knowledge, bare facts and their systematic classification are of no particular interest except to the specialist. The world at large is concerned chiefly with general laws or practical applications. The ordinary individual cares nothing about the atomic weight of polonium, for in-

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stance, or about knowing that it is seventh in the series of elements produced from radium. If he is told that its "half period of transformation" is 140 days, and that the range of its rays in the air is 3.86 centimeters, he does not understand what is meant, and promptly forgets the whole matter. Toward the laws, however, which govern the action of polonium, his attitude is quite different. The first great law is that the transmutation of metals can and does take place—not as the alchemists supposed, but in a far more significant fashion. In the light of this law, the statement that polonium is the seventh in the series of radium derivatives takes on a new meaning. For some absolutely unknown cause, radium and other radioactive substances are not permanent, in spite of the fact that they are genuine chemical elements. In periods varying from billions of years to the five-hundredth part of a second, they are transmuted into other substances, which likewise are genuine chemical elements. The more we know of this law, as distinguished from the empirical facts of observation, the more our interest and wonder are aroused. The activities which it governs cannot be initiated, hastened, hindered, stopped, or otherwise altered by any known means. The activity of hot bodies, on the other hand, can be changed by cooling; magnetic masses can be demagnetized; moving bodies can be stopped or deflected from their courses; and living beings can be killed. Gravity alone is as unchangeable as radioactivity; do what we will, we cannot cause a particle of matter to lose or change its power of attracting other particles; nor can we alter the process by which radioactive substances steadily transmute themselves and give off energy in a long and complex process of gradual decay. This it is—this immutable law—which forms the climax of interest in any study of radioactivity.

In the science of geography, the laws are no less interesting than in radioactivity or any other branch of science, but this is rarely recognized. Attention is commonly concentrated on mere facts instead of on the laws which govern them. One reason for this is that the laws, dealing as they do with life as well as matter, are in the highest degree complex and difficult to frame. Another reason is that the facts themselves are of great interest, even apart from the laws. Take such an unimportant item as the ichthyophagi. Two thousand years ago, the Greeks heard with wonder of tribes whose sole diet was fish. Nearchus, who accompanied Alexander to India, tells of ichthyophagi along the coast of Makran in southern Persia, and modern travelers confirm his ac-

counts. They add that the country is so barren that, in years of drought, even the abstemious donkeys cannot find sufficient grass or weeds to support life, and would die, did not their masters feed them upon dried fish. Pliny locates the ichthyophagi on the islands of the Persian Gulf; Pausanias mentions others on the west coast of Arabia where Burton found them in modern times; and other travelers report them elsewhere. Ancient scientists and modern authors of books of travel are not the only persons interested in fish-eating tribes. In central Asia I told my caravan men one day that I proposed to visit the Lopliks who lived several hundred miles to the east on the shores of the shallow and almost dry lake of Lop-Nor. After a few hours, one of the men came back from the market-place, whither he had been to make inquiries, and proceeded to ask questions. "Is it true that those Lopliks whom we are going to visit eat nothing but fish? What beasts they must be. And is it true that they are so skilful in eating fish that they can put the meat in at one side of their mouths and spit the bones out at the other side at the same time?"

Geographical facts like those pertaining to the ichthyophagi are almost innumerable. Strangely enough, their interesting nature, large number, and wide distribution are among the chief causes why geography still labors under the imputation of being a purely empirical or descriptive science. Because the facts in themselves are entertaining, there has been a failure to realize the necessity of coördinating them and finding out their laws. Geographers themselves have fostered this idea. The majority of them have failed to apprehend that the mere collection of facts is not science. Moreover, because of the vast number of highly interesting geographical phenomena scattered all over the world, every traveler has felt impelled to gather his own little sheaf. Having published his observations, he has considered himself a geographer, although with no more claim to the title than has the gatherer of a bunch of wild flowers to be called a botanist. Genuine geographers have rebelled against this invasion of their province by men of no adequate training. Yet instead of directing their own energies to the patient sifting of facts, in order to discover laws, they have zealously devoted themselves to mapping new portions of the earth's surface. Their work has been done scientifically and is of great value, but it belongs to the first, or empirical, stage of the science. In their zeal for this work, they have often forgotten the other phases of the subject. Thus, although thousands of men, both travelers and map-makers, have been called geographers, only

a handful have given their lives to the work of systematic classification, and still fewer to the final explanatory stage of the science. This, more than anything else, explains the common but fallacious idea that geography is purely descriptive and lacks the qualities of real science.

In order to arrive at a true understanding of the present and future status of geography, let us examine the nature of the subject and its adaptation to the purposes of higher education. The courses in the German universities, where the subject is best taught, deal with a wide range of subjects, but in spite of their great diversity, all center around one basic idea, the keynote of geography. Just as the physiological chemist, the botanical chemist, the metallurgist, the general chemist, the inventor of dyes, and a score of others are all chemists engaged in answering the questions: "What is it made of?" and "How is it put together?", so the geographers, as Professor J. L. Myres, of Oxford, has well put it, are all answering the questions: "Where is it?" and "Why is it there rather than elsewhere?" Geography is primarily the science of the distribution of phenomena on the earth's surface; maps are its foundation, just as systematic floras are the foundations of botany. The geographer deals with everything whose distribution can be shown upon a map, whether it be incised meanders, chinook winds, yellow skins, or cowardice. This does not mean that geography is a blanket science composed of interesting bits from all the neighboring sciences, and therefore no science at all, as is sometimes thought. The chemist may legitimately study meanders in the sense of analyzing water, soil, and rock; he may investigate the chemical differences between warm, dry chinook winds and other winds; he may ascertain the nature of the pigments which make one skin yellow and another brown; and he may tell us that the mental state known as fear or cowardice is accompanied by the formation of certain toxic substances which can be detected in the blood or breath, and which hinder the bodily functions. Yet no one thinks of denying that chemistry is a distinct and full-fledged science. The chemist is obliged to study everything, but he does so for the definite purpose of determining the nature and amount of the various chemical elements, their mode of union, and their changes. In the same way the geographer studies everything, but he does so in order to determine where things are located, and why they happen to be there rather than in some other part of the world.

Take such a matter as the trade of China. The economist studies

the laws of trade and applies those laws to China. He accepts the fact that China's trade per capita is not one one-hundredth as large as that of Belgium, but that does not concern him greatly, for the laws of production and exchange are the same in both countries. It is beyond his province to attempt a complete analysis of exactly why conditions in China and Belgium are different. He must leave that question to geography, the only science whose function it is to answer it. The economist may and must use the geographer's results or methods, just as the astronomer must call on the physicist for help, or the historian on the philologist. It is no part of the economist's task, however, to investigate the relation of topography to geological structure; he is not concerned with seasons of rainfall and crops as the result of planetary and terrestrial pressure-systems; he does not investigate lines of communication as determined by space relations, nor the distribution of population and the consequent variation of modes of life from place to place. He simply cannot do it, partly for lack of training, and partly for lack of time. To find out why a certain phenomenon is located in a special corner of the earth is as distinct and complex a problem as to discover the mathematical formulas for the strains and stresses in a bridge.

Thus far we have been considering the present position and nature of geography, and the reasons why its function has been misunderstood. Let us now consider its educational value. The essential criteria in determining the educational value of a subject may be stated in many ways. For our present purpose we may state them as follows: (1) the importance of the subject in everyday life, (2) historic importance, (3) cultural value, (4) definiteness of the field of study, (5) organization of material, and (6) disciplinary value.

The importance of a subject in everyday life and its consequent importance in education are well illustrated by chemistry. No thoroughly equipped man can afford to be ignorant of the principles of this subject, because it fills so large a place in the world's activities. The second criterion, historic importance, commonly has as much weight as present importance in determining what studies shall be employed in the training of our youth. It is this, in large measure, which keeps Greek and Latin in our curricula. The third criterion, cultural value, is in itself sufficient to justify attention to a subject. We devote a great amount of energy to the study of English literature, largely because a man thereby lays up a store of that which lends interest to his own inner life, grace and

point to his speech, and discernment to his taste. The very fact that literature is so important culturally makes amends for its failure to satisfy the next criterion, definiteness of the field of study. Literature is avowedly a somewhat indefinite field, differing in that respect from history. While the student of literature does not pretend to be seeking an answer to any definite question, the historian has always present in his mind the query, "What happened, where, and why?" and hence he knows exactly how to go to work. Definiteness of field is closely connected with the next important criterion, organization of material. Mathematics is pre-eminent in this respect. Not only are its laws framed with the most absolute precision, but its method of presentation to students has been developed to the highest degree. The last criterion, disciplinary value, is possibly the most important of all. It depends largely upon definiteness of field and organization of material, and also upon the degree of interest of the subject-matter itself. Physics is notable in this respect, because it combines the most abstruse reasoning with highly interesting and stimulating experimentation.

No one subject fully satisfies the requirements of all these criteria, but that is not to be expected. All the subjects which now hold an important place in the ordinary college curriculum, satisfy the majority of the criteria, and geography seems to hold its own in this respect. Taking geography in the modern sense as the science which explains why things are where they are, there is no need of explaining its importance either in the life of to-day or in that of the past. No question, for example, is more worthy of profound study than that of why the island of Japan is inhabited by people so markedly different from those of the neighboring mainland. As a matter of culture, also, the consideration of such problems is of the highest value. Without further discussion, therefore, we may fairly assert that in regard to the first three criteria —present importance, historic importance, and cultural value— geography holds a high position. The fourth criterion may also be dismissed, for we have already shown the definite nature of the field of geography as the science dealing with the distribution of phenomena on the earth's surface and with the reasons for that distribution.

The question of the organization of material is the criterion which geography has at present most difficulty in satisfying. It cannot be gainsaid that, except in the elementary phases of the subject, good text-books are rare. Geographers themselves are still discussing the question as to how the subject should be presented

to students. Several effective methods are now in use, and university teachers are already in accord upon the fundamental principles of presentation. It is nevertheless true that advanced geography cannot be successfully taught by a teacher who relies on text-books rather than on his own initiative. In this respect, however, the science is scarcely worse off than the rest of the newer sciences, such as experimental psychology, anthropology, and the other sciences dealing with man as a biological product. In all of these subjects advances are so rapid that a good teacher cannot stick to the text-books, but must lay out his work along his own lines.

We come now to our last and most important criterion, disciplinary value. Does the study of geography compel the student to pursue a definite chain of reasoning, link after link, and does it thus train him to think? The descriptive phases of the subject, upon which the lay mind places such undue stress, have neither more nor less value than the learning of dates and events in history, or of the names, properties, and numerical values of the elements in chemistry. The explanatory phase, however, demands as close and careful reasoning and as great mental activity as are required by any of the other sciences.

An example will make this clear. As everyone knows, the people of India are shackled hand and foot by an inexorable system of caste. So strong is it that Moslems and even Christians cannot escape from its exactions. I have seen poverty-stricken Moslems throw away a large supply of good food because it had been prepared for the table of a Christian. Their own religion did not prevent their touching it, but they were filled with the Hindu prejudices of their ancestors and their neighbors. In a rural district of the Deccan, while riding in an oxcart to visit the Buddhist cave-temples of Ajanta, I have paid for a newcomer's ignorance of the absolute dominance of caste by going hungry for a day. Even water was unprocurable except by having the driver go to a wayside well, fill the brass bowl which he carried in his girdle, and pour the water into the foreigner's hands without letting him touch it. The first time that we wanted a drink I inadvertently put out my hand to take the bowl; the Hindu, fearing pollution of his drinking vessel, jumped back as if he had seen a tiger.

In Arabia, on the contrary, quite the opposite condition prevails. Nowhere in the world, probably, is there a greater degree of fraternity and democracy than among the Arabs, especially the nomads. So strong is the spirit of democracy that it has spread

its influence more or less into all Mohammedan lands, including even parts of India. The richest and the poorest of the Arabs put their hands to the same dish; and the stranger, be he black man or white, is invited to share the best that the Arab can procure. The contrast between the spirit of caste among the Hindus and that of democracy among the Arabs may be treated from the religious, the historical, the sociological, and perhaps other points of view, but that need not here concern us. From the point of view of the geographer, the important fact is that this contrast occurs in two similar peninsulas lying side by side in almost the same latitude on the southern side of the same continent. Is there any respect, he asks, in which physical environment has fostered the development of caste in India and of democracy in Arabia? Could the reverse have happened?

With these questions in mind the geographer investigates the physical phenomena of the two countries. He finds first that the geological processes of continental uplift, faulting, folding, vulcanism, erosion, and recent oscillations of the relative level of land and sea, have produced a rather marked similarity between the two peninsulas. If the mountainous district of Oman, on the east of Arabia, be omitted, the resemblance is truly striking. An arc of mountains lies on the north; then come vast, fertile river plains; farther south, the center of the neck of each peninsula is occupied by a mass of ancient mountains maturely dissected; on the west coast of the peninsulas proper, a steep escarpment prevents easy access to the sea; while at its top, great lava fields spread eastward over an area of thousands of square miles. From the lava fields a long slope stretches across to the low east coast, where recent uplift has produced a coastal plain; and finally, in the far south of both India and Arabia, high mountains rise to face the southern ocean. If topography alone controlled the fortunes of a country, India and Arabia should fare almost alike, with a slight advantage on the side of Arabia.

From topography we turn to space relations, and find that in this respect Arabia is decidedly the more favored. Lying, as it does, between India and Europe, with Africa on the one flank and Turkey and Persia on the other, it ought to be in the very center of the world's activity. If other conditions were favorable, it would be touched and vivified by influences from four highly diverse types of civilization, and could scarcely fail to respond. Its relation to the sea would be another factor tending in the same direction. India, with her precipitous west coast and harborless

east coast swept with drifting sand, faces seas so wide and islandless that her people have never been tempted abroad to any great extent. Arabia, on the contrary, although not blessed with many good harbors, has long stretches of coast which are good for habitation, so far as topography alone is concerned, and which face narrow seas or gulfs favorable to primitive maritime enterprise. Even under the present hard conditions of life, maritime enterprise has been fostered in Arabia more than in India, and to this, in part, is due the fact, that Mohammedanism, not Hinduism, has spread to the East Indies.

The relative advantages of Arabia over India in topography, space relations, and coasts are completely nullified by its climate. Everyone knows that both countries are characterized by great climatic extremes, which cause some sections to be absolute deserts, while others are abundantly watered and highly fruitful. Everyone knows also that the chief difference between the two is that in India the desert areas are relatively small, while in Arabia the watered areas are even smaller. Few, however, understand why this is so. An adequate explanation, such as is demanded by modern geography, borrows from the physicist the laws of gravitation, rotation, expansion of gases, latent heat, condensation, and other matters. From these it works out first the planetary zones of pressure, and the terrestrial modifications of these zones by the tilting of the earth's axis and by the distribution of land and sea. Then, knowing where and why areas of high and low pressure occur at certain seasons, the geographer is in a position to understand what winds will blow in Arabia as compared with India, and what amount of condensation of vapor will take place under given conditions of topography. The line of reasoning is too long and complex to be given here, and we must hasten on to apply our conclusions to the caste system.

When the topography, climate, and other physical factors are understood, the geographer investigates their effect upon human occupations and modes of life, and upon the distribution of industries. He finds that in the major part of Arabia nomadic pastoralism is the only possible form of life. Even in the oases no great variety of occupations, or of modes of cultivation, is possible because of the extreme limitation of resources. The villager, whether in the north or the far south, raises a little wheat or millet and waters a few palm trees, set either in deep pits to be as near as possible to the level of ground water, or else located beside the brackish, lukewarm stream from some small spring in the midst

of a waste of verdureless desert. Often the villagers own the trees in common with the nomads. The villagers do the work of irrigation, getting water from wells, perhaps, by means of a long rope, a leather bucket, a pulley, and a patient camel striding slowly back and forth. The nomads protect the trees from raids by enemies, and are responsible for the safety of the village. For this seemingly slight, but really large, service they receive half the crop of dates. For a thousand miles and more, one oasis scarcely differs from another, and monotonous uniformity is the rule. Moreover, the nomads are compelled to move constantly from place to place in search of water or pasture, and often they go hundreds of miles each year. Thus they come into constant touch, not only with one another, but with the oasis dwellers near whom they are forced to camp in order to get water in times of especial drought. This, too, tends to promote uniformity, for local customs have little opportunity to grow up. Again, no nomad can carry any very large or sumptuous tent, or great abundance of furniture, on his camels; and the differences in style of living between rich and poor are thus limited.

Still another factor tending toward uniformity results from the peculiar moral standards of the desert. In years of scanty rainfall, no grass sprouts up in the early spring at the time when the young are born. The hungry mother camels have no milk whereon to nourish their colts, and the poor little creatures soon die. Nor is there milk for the Arabs themselves, and no hard, sour curds can be laid by for winter use. The date crop and the grain in the oases are also scanty; and gaunt famine stalks among the black tents of the desert. Under such circumstances the only resource is plunder. The man who is hungry, and whose wife and children are starving, has little thought of right or wrong. If he can take the property of someone outside the range of his own tribe and friends, he feels that he is doing right. To think otherwise would mean starvation. Thus, through thousands of years, the hard conditions of the desert have steadily weeded out all who withheld their hands from violence. Raids and plundering expeditions are a matter of course among the Arabs. There is nothing to put a stop to them, for there is nothing to favor the growth of a moral sentiment against them. Thus it comes to pass that rich and poor alike, but especially the rich, who have the most to lose, are in constant peril of being reduced to beggary by a raid of their neighbors. So common is this that a man's social position has little connection with the number of his camels. If an Arab is reduced to dire poverty by a raid, his

friends often contribute camels enough to enable him to support his family, and this is not considered charity, but merely justice. All the Arabs are subject to the same dire pinch of hunger and to the same danger of utter impoverishment; and this, as much as anything, helps to keep them democratic.

In India the conditions are almost the opposite of those in Arabia. The favorable rainfall of the major part of the country promotes a sedentary life; and an abundance of forests and the ravages of wild beasts combine with a rough topography, in many portions of the peninsula, to prevent much intercourse. To this is added the effect of a uniformly warm climate with few and gentle changes, a condition which deadens initiative and activity and gives rise to mental and physical inertia. Moreover, the extreme variation of natural conditions in regions not far remote from one another, compels the people to raise their crops, build their houses, make their clothes, and carry on a hundred other occupations in wholly diverse ways. Thus the geographic conditions of India tend as strongly toward diversity as do those of Arabia toward uniformity.

The geographer cannot leave the matter at this point. He must find out why India is inhabited by a most heterogeneous mixture of races, and Arabia by practically pure Semites. Most of the people of India, so far as we know, came from the north or northwest, that is, from the dry districts of central Asia, including Persia, Afghanistan, Russian and Chinese Turkestan, Tibet, and Mongolia. During exceptionally dry seasons, as travelers have seen again and again, the nomad of these regions are forced to migrate long distances in search of pasturage, and often come into warlike conflict with their neighbors. In the past, certain periods lasting for centuries appear to have been times of prolonged favorable rainfall, and these have been followed by centuries of increased aridity. During each dry period, the people of central Asia have been forced outward and have moved into China, India, Asia Minor, or any other region where life was possible. A full understanding of this matter involves a review of a vast amount of topographical, meteorological, archæological, and historical data, and a careful weighing of evidence. Adverse climatic periods, together with overpopulation due to other causes, have induced migration after migration into India. Therefore, the people of different parts of the country vary in race, language, customs, ideals, and religion. In many places, also, the population has become stratified as it were, conqueror after conqueror imposing his race as the exclusive upper

stratum of society. When India herself has suffered from overpopulation she has had no relief. Hemmed in by huge mountains, vast deserts, hungry nomads, and wide seas, her people have never been able to move out to new lands. Those who could not get a living have died of starvation, but nothing has happened to obliterate the human diversity due to her physical diversity and her frequent invasions.

In Arabia, on the contrary, because the country is a desert, the great movements have all been outward, never inward. When favorable times allowed of increase of population it has come about almost wholly by growth from within, not by migration from without. Thus Arabia has preserved unity of race, speech, and customs, while India has grown more and more diverse. The one has been prepared by nature for a religion of which democracy is the keynote, the other for a religion bound in the fetters of caste. It could scarcely have been otherwise.

Here the geographer leaves the matter. It is not his function to study the intricate ramifications of Hindu caste or of Moslem democracy. That must be left to students of comparative religion or anthropology. Geography stands, as it were, between the science of geology, which deals with the past and with the interior of the earth, and the great group of sciences, such as biology, ethnology, economics, and history, which deal with life as it now exists. The field of geography as the science of the distribution of phenomena upon the earth's surface is distinct and well defined; its laws, although intricate and as yet only beginning to be known, are precise and clear; and its sustained and intricate modes of reasoning are in the highest degree disciplinary.

GEOGRAPHICAL INFLUENCES IN THE DEVELOPMENT OF WISCONSIN*

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CHAPTER IV. DEVELOPMENT OF WISCONSIN AS AFFECTED BY ITS MINERALS

LEAD

The lead of the upper Mississippi valley is found in the Trenton-Galena formation, which outcrops in such a way that mining by surface diggings was, in the early days, an easy matter. The productive areas include a part of eastern Missouri and a district where the states of Iowa, Illinois, and Wisconsin join. The Wisconsin section occurs within the counties of Grant, Iowa, and Lafayette. The presence of the lead ore was known to the Indians,

* Continued from pp. 401-412, 490-499 and 585-609.

but there is no evidence that they made any use of it until the introduction of fire arms by the French. This event gave the lead a value to the savages both for bullets and as a medium of exchange. The French obtained information of the lead very early, as Hennepin's map of 1687 locates mines in the vicinity of the present city of Galena, Illinois.[1] In 1690 some French traders bought lead from Indian mines on the Galena River. Perrot built a stockaded post in the region and worked the mines that same year. The Indians probably learned from the French to mine and reduce the ore in a very crude way. The squaws usually dug the mineral, at first using buck-horns, but later hoes, shovels, and crowbars, which they obtained from the traders. The ore was elevated from the pits in which it was dug by means of deerskin sacks suspended by thongs of the same material. It was then carried in sacks to the smelting places. The lead was separated from the ore and run into "flats" weighing about 70 pounds each. "These flats were formed by smelting the mineral in a small walled hole, in which the fuel and mineral were mingled, and the liquid run out in front into a hole scooped in the earth, so that a bowl-shaped piece of lead was formed therein."[2]

The mines soon attracted a small transient population, and in 1743 there were 18 or 20 miners in the region.[3] In 1741 2,228 bars of lead, weighing from 60 to 80 pounds each, were taken from one mine. Mines were worked in several places on both sides of the Mississippi River. Carver's map of 1776 locates one at Mineral Point, and he mentions seeing large quantities of lead ore in the large Sauk village at what is now Prairie du Sac.[4]

About 1766 there was a considerable trade in lead with the French colonies in Louisiana. Large boats capable of carrying 20 tons and propelled by 20 oars came up the Mississippi from New Orleans twice a year and returned with lead and such other produce as was available. The up-river trip took 70 days or more, but the return was much shorter and could even be accomplished in from 14 to 16 days during the May and June floods. There was a large profit in the lead business of that day. Miners who worked their own claims often made $30 a day for weeks together.[5] The traders also made a good profit. Julien Dubuque, who came into the region of the city named from him about 1788, became rich in the indus-

[1] Thwaites, R. G.: Notes on Early Lead Mining, *Wis. Hist. Coll.*, Vol. XIII, p. 272.
[2] Shaw, J.: Narrative, *Wis. Hist. Coll.*, Vol. II, p. 228.
[3] Thwaites, R. G.: Notes on Early Lead Mining, *Wis. Hist. Coll.*, Vol. XIII, p. 276.
[4] Gregory, J. G.: Jonathan Carver, *Parkman Club Papers*, No. 5, p. 79.
[5] Thwaites, R. G.: Notes on Early Lead Mining, *Wis. Hist. Coll.*, Vol. XIII, p. 278.

try. Dubuque obtained from the Sauk and Fox Indians a formal permit to work the lead mines without interference.[6] His operations were very extensive. He employed Indians to prospect for lead mines, Canadians and half breeds to prove the claims and sometimes to work them. Often, however, he allowed the Indians to work the mines and bring the product to his trading-house on the west side of the river.[7] In 1805 Dubuque admitted taking from 20,000 to 40,000 pounds of lead yearly from his mines, mostly west of the Mississippi.[8]

In 1804 the Sauk and Fox Indians relinquished to the government their claim to lands east of the Mississippi, including the lead mines. A portion of the tribes moved away and the Winnebago squatted in the district and did some mining. In 1810 the Sauks and Foxes still in the region mined 400,000 pounds of lead, which they exchanged for goods with the traders.[9]

In 1807 Congress reserved the mineral lands from sale, but ordered that 3 to 5 year leases be granted to individual miners. No leases were taken out in Wisconsin until 1822, and mining operations continued as before. In 1822 Col. James Johnson took out a 3 year lease. He engaged keel boats, which took up the river to the site of Galena a supply of good tools and a party of workmen, including some negro slaves.[10] He operated under military protection and did a successful business.

At this time there were several French and Indian settlements in the region, but very few Anglo-Saxons. As soon, however, as Col. Johnson's success became known, men came to the mines in great numbers. They arrived on the Mississippi River boats, on foot, on horseback, by wagon and stage. The Indian trails from northern Illinois were quickly converted into roads by the passage of the many immigrants. The newcomers came from all sections of the United States and from Europe. Cornishmen arrived as early as 1827.

This swarm of immigrants, supplied with good tools and firearms, drove the Indians from the mines and appropriated everything they wanted. Towns sprang up quickly. Smelting furnaces were erected, new mines were opened, old ones that had become too deep for the Indians to work with their crude tools were in

[6] Thwaites, R. G.: Notes on Early Lead Mining, *Wis. Hist. Coll.*, Vol. XIII, p. 279.
[7] *Ibid.*, p. 282.
[8] *Ibid.*, p. 283.
[9] Letter from Nicholas Boilvin, Indian Agent, to Wm. Eustis, Sec'y of War, *Wis. Hist. Coll.*, Vol. XI, p. 252.
[10] Thwaites, R. G.: Notes on Early Lead Mining, *Wis. Hist. Coll.*, Vol. XIII, p. 290.

many cases reopened and operated with great profit. The population on July 1, 1825, was 100; in August, 1826, it was 453.[11] The heaviest immigration was in 1829. In 1830 Wisconsin had a permanent population of 3,635, and a transient population of many thousands more, mostly in the lead region (Fig. 8, in Chap. III, p. 588).

This influx of settlers caused great uneasiness among the Indians, who saw what they had regarded as their property being used by the ever-increasing white population. The Winnebago War of 1827 came as a result of the apprehensions of the Indians. Black Hawk's village was one of the largest Indian communities in the West, containing 500 families. The cultivation of about 3,000 acres of rich alluvial land near by was the chief means of subsistence of these people. The invasion and appropriation of this tract by squatters, who drove away the squaws and children, was the direct cause of Black Hawk's War in 1832.[12]

The output of lead from the upper Mississippi mines increased from 335,130 pounds in 1823 to 54,494,850 pounds in 1845. After this date the production declined, and in 1852 the output was only 28,603,960 pounds.[13] Before 1830 the ore brought about $80 a ton, but the tariff of 1830 reduced the duty and the price materially.[14]

In the beginning most of the lead was taken to market by way of the Mississippi River to New Orleans and the Atlantic to New York. This route was very roundabout and unsatisfactory. During low water the rapids at the head of Rock Island and at the mouth of the Des Moines River necessitated the reshipping of the cargo to small flat boats, which added greatly to the freight rates. Because of the difficulties and length of the southern route some small amounts of lead were sent east by the Fox-Wisconsin water route and the Great Lakes as early as 1822. After the erection of the Helena shot tower, which was built in 1833 and operated by a man from Green Bay, more material went by way of the Fox-Wisconsin. The cost of transporting lead to New York by way of Green Bay, the Great Lakes, and the Erie Canal was about $18 a ton, while the cost by the Mississippi-Atlantic route was $30 a ton.[15] The prospect of attracting the lead and shot trade to the East by way of Green Bay led to the formation of the Portage Canal Company in 1834, the object of which was to cut the Fox-

[11] Thwaites, R. G.: Notes on Early Lead Mining, *Wis. Hist. Coll.*, Vol. XIII, p. 291.
[12] Wisconsin in Three Centuries, Vol. II, p. 188.
[13] *Hunt's Merchants' Magazine*, Vol. 40, p. 244.
[14] Legler, H. E.: Leading Events in Wisconsin History, p. 167.
[15] Libby, O. G.: Significance of the Lead and Shot Trade, *Wis. Hist. Coll.*, Vol. XIII, p. 308.

Wisconsin portage by a canal. The Wisconsin Internal Improvement Company, incorporated in 1835, was designed to improve the navigation on these rivers.

As early as 1836 lead was hauled overland to Lake Michigan in wagons drawn by oxen, and by 1839 a road was opened between the Mississippi River and Milwaukee.[16] In the summer, when the drivers could sleep on their wagons, and the oxen could procure food along the roadside, the cost of hauling the lead to Milwaukee was 50 cents a hundred pounds.[17] Returns from a shipment were received in four weeks by the Milwaukee route and in three months by the Mississippi-Atlantic route. The overland route to the East was used increasingly after 1839, and the Green Bay route was abandoned gradually. While the latter had been a first-class fur-trade route, it was too long and roundabout and required too much handling of freight to hold the lead trade. Milwaukee exported 1,888,700 pounds of lead and 2,614 kegs of shot in 1842,[18] and 2,200,000 pounds of lead and 250,000 pounds of shot in 1843.[19] This shows the increasing tendency to ship the lead overland.

The Helena shot tower on the south bank of the Wisconsin River in Iowa County manufactured a part of the Wisconsin product. As the shot makers of Missouri controlled the southern market, Wisconsin shot was compelled to find a market in the East. It was hauled to Milwaukee by " sucker " teams, which came from northern Illinois in the spring and returned in the fall. Local teamsters also engaged in the business, and farmers sometimes brought produce to Mineral Point and Dodgeville for sale, hauled lead to Helena, and from there took a lot of shot to Milwaukee.[20] The lead wagons returning from Milwaukee were always loaded. They carried lumber, shingles, hardware, salt, merchandise, and often immigrants and travelers. Helena came to be a supply station of considerable importance. From here grain as well as some lead and shot were shipped down stream to Galena. When the Milwaukee and Mississippi Railroad was built along the lower Wisconsin, it passed on the opposite side of the river from Helena. Helena could not compete with the railroad towns and gradually lost most of its business and population. The first shot carried east from Helena by the railroad was 110,201 pounds in 1853.

[16] Thwaites, R. G.: Wisconsin, p. 296.
[17] Wisconsin in Three Centuries, Vol. II, p. 273.
[18] *Ibid.*, p. 274.
[19] *Hunt's Merchants' Magazine*, Vol. VIII, p. 380.
[20] Libby, O. G.: Significance of the Lead and Shot Trade, *Wis. Hist. Coll.*, Vol. XIII, p. 353.

The railroad carried 415,714 pounds in 1857, and 16,480 pounds [21] in 1861—after which date the shot tower was closed.

The production of lead in the Galena region increased until 1845, remained about constant for two years, and then decreased. The output of 1840 was 22,249,000 pounds,[22] of which Wisconsin produced 15,129,000 pounds, valued at $500,000. The state then had 49 smelting plants, representing a total capital of $664,600.[23] The great bulk of the upper Mississippi lead was still being shipped to St. Louis and New Orleans in 1845, but the percentage of lead that went south decreased steadily thereafter. In 1845 54,494,850 pounds came from the mines,[22] St. Louis and New Orleans receiving 51,000,000 pounds of it.[24] In 1857 the production was 34,183,000 pounds,[22] while only 14,000,000 pounds went to the southern cities.[24] New Orleans was affected most seriously. In 1852 when the mines produced 28,603,960 pounds of metal,[25] 17,985,000 pounds were received at New Orleans.[26] In 1854 the output was 29,650,000 pounds [25] and in 1856 30,000,000 pounds.[25] In those two years the receipts at New Orleans were 5,000,000 [27] and 1,000,000 pounds respectively. The great bulk of the lead was being "forwarded to the northern cities." [28]

There were various causes for the diversion of the lead trade to the East, some of which have been noted. (1) While the conditions of navigation on the Mississippi were never good, they were made worse by the protracted low water of 1839–40. A stagnation in trade resulted. Lead accumulated in the hands of dealers and had to be held until there was water enough to allow it to be carried down river. Freight rates from St. Louis to the mining region increased; $2 to $3 a barrel was charged for flour, and similar prices for other freight.[29] Wheat was worth only 37½ cents a hundred in the Rock River region, while flour brought $10 to $12 per barrel.[30] (2) Because of the extent and importance of the industry the merchants desired a more direct line of communication to the East, by means of which they could get the produce to market and receive returns in a shorter time. (3) The

[21] Libby, O. G.: Significance of Lead and Shot Trade, *Wis. Hist. Coll.*, Vol. XIII, p. 369.
[22] *Hunt's Merchants' Magazine*, Vol. 40, p. 244.
[23] Census Report of 1840.
[24] *Hunt's Merchants' Magazine*, Vol. 41, p. 126.
[25] *Ibid.*, Vol. 40, p. 244.
[26] *Ibid.*, Vol. 29, p. 572.
[27] *Ibid.*, Vol. 31, p. 476.
[28] *Ibid.*, Vol. 27, p. 430.
[29] Libby, O. G.: Significance of Lead and Shot Trade, *Wis. Hist. Coll.*, Vol. XIII, p. 315.
[30] *Ibid.*, p. 316.

monopoly of the southern trade by the shot makers of Missouri sent the shot from Helena to the East. (4) The chief owners of the shot tower between 1836 and 1843 were Buffalo men who created a market for their produce in that city, and when the tower changed hands in 1843 the route was too well established to be changed.[31] Lead was naturally shipped in the direction in which the shot was sent. (5) In 1841 the manufacture of white lead was commenced at Buffalo, 10 tons being made in that year.[32] The low price of lead in 1842 encouraged the establishment of other paint factories, which consumed a large portion of the Wisconsin lead. (6) By request of Governor Doty of Wisconsin, the freight rates for lead on the Erie Canal were reduced in 1842, which encouraged shipping along the eastern route.

The imports of lead into Buffalo were 23,926 pigs in 1842, and 23,753 in 1843,[33] all of which came by the Great Lakes. By 1845 the trade to the East was well established; 4,200 pigs entered Buffalo in April of that year.[34] The demand for better transportation in Wisconsin came not only from those interested in the lead industry but also from the farmers. Their surplus produce was without a market. Wheat was cheap and flour and other manufactured articles were high because of the cost of transportation. The agricultural products became a much more important element in the commerce of the state than was the lead, but the lead created the first demand for better transportation across the state and caused the agitation for the Milwaukee-Rock River Canal, which finally resulted in the Milwaukee and Mississippi Railroad.

The shifting of the lead trade from a north-south to an east-west route was only one phase of a general change then occurring in all lines of trade. The South was, and still is, largely agricultural and needed but little that Wisconsin produced. The East, on the contrary, was, even then, largely industrial and had to be supported by raw products from other parts. The market which induced this change in the direction of trade has been of very great importance to Wisconsin's industries.

The decline of the lead industry after 1845 is traceable to several causes. (1) The early diggings at and near the surface were worked out, and expensive methods and machinery were necessary to mine at greater depths below the level of ground water. (2) The

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[31] Libby, O. G.: Helena Shot Tower, *Wis. Hist. Coll.*, Vol. XIII, p. 358.
[32] *Ibid.*, p. 319.
[33] *Ibid.*, p. 324.
[34] *Niles Register*, Vol. 68, April 19, 1845, p. 102.

knowledge of the geology of the region, which should have located the ore and determined its commercial value and the best methods of working it, was inadequate. (3) The profit on lead mining and manufacture was diminished materially by the tariff of 1846, which decreased the duty on lead, and this, together with the difficulty of mining, discouraged further efforts. (4) The discovery of gold in California in 1848 was a signal for emigration from the lead region. (5) The copper and iron mines of Lake Superior attracted many. (6) The discovery of silver with accompanying lead in the Black Hills in 1860 served to increase the neglect of the upper Mississippi mines.

The population of the townships directly concerned in mining increased until 1870, after which date there was a steady decrease.[35] The same is true of the land values per capita and the farm produce per capita.[36] The non-lead townships, on the contrary, increased in population after 1860, and usually, too, in farm values and produce per capita. This is due to the fact that with the decline of the mining industry the younger and more vigorous men emigrated, leaving the work to be carried on by the older and less enterprising ones. They continued to operate in the old-fashioned and unprofitable way, keeping out immigrants who would have developed the agricultural resources. The non-lead townships are no more fertile than the lead townships, but their population and industrial life were replenished by young settlers who developed the resources in a modern way. This state of affairs is reflected in the political life. The lead townships are characterized by the complaint of hard times; the men vote, as a rule, against the party in power. The non-lead townships, on the contrary, are thriving, prosperous, and satisfied with the government.[37]

One effect of the lead industry in Wisconsin was to attract and distribute population in the southern part of the state. The first was a population of French and Indians. It was small and, until the Sauks and Foxes engaged in the business, transient. Anglo-Saxons came in about 1819, though the great rush did not begin until three years later. This was also largely transient. The necessity of furnishing themselves with provisions at a reasonable cost led the miners to give out glowing accounts of the fertility of the region, thereby attracting an agricultural popu-

[35] Libby, O. G.: Lead Region of Southwestern Wisconsin, *Trans. Wis. Acad. Arts, Letters, Sci.*, Vol. 13, p. 193.
[36] *Ibid.*, p. 194.
[37] *Ibid.*, p. 195.

lation. The population of 1830 was almost entirely located in the southwestern part of the state (Fig. 8, in Chap. III, p. 588). By 1840 there was a thickly settled area around Milwaukee, but the connection between that and the population of the lead region was slight (Fig. 9, in Chap. III, p. 589). The sympathies of the people near Lake Michigan were with the East, since the majority of them had come from New England and New York. The affiliations of the lead miners, on the contrary, were with the South. Many of the operators were Southerners, and they often used slaves in the mines. Their economic relations were with St. Louis and New Orleans, and their intellectual life had its center in those two cities.

The interrupted navigation of the Mississippi, caused by low water, forced the lead miners to make a route across the state to an eastern market. This brought them into contact with the eastern population and gave them a new interest. The cities along the Lake profited by the lead trade and encouraged it in all possible ways. The territory between the eastern and western sections was settled, in part at least, by people brought out on the freight wagons that plied between the two sections. The paths made by the lead wagons guided the settlers into the interior from the lake ports. Without them it is doubtful if the two sections of the state would have been so closely united as appears on the population map of 1850 (Fig. 10, in Chap. III, p. 591).

The question of the transportation of lead and later of agricultural products from the West to the East formed a common bond between the two sections, and they united in the endeavor to secure legislation on the subject. The influence of capitalists of Milwaukee, Buffalo, and New York, who had been attracted by the lead trade, was thrown into the scale for better lines of communication between the Mississippi River and Lake Michigan, and served still further to unite the two sections of the state.

In general, the lead trade attracted and distributed population throughout the southern counties of Wisconsin, it brought capital into the state, and gave a strong impulse to its industrial life. Where it was carried on after it had ceased to be profitable, it caused a decrease of prosperity and population.

Iron

Iron ores are found in several localities in Wisconsin. The first to be developed were those of Dodge and Washington Coun-

ties, a furnace being built at Maryville before 1855.[38] By 1859 there was a furnace at Ironton, Sauk County, and another at Black River Falls, making three in the state, all built to use native ores. In 1865 another furnace was built at Iron Ridge, Dodge County.[39] The iron industry in the southern part of the state was developed quietly and gradually, with little or no "boom," and with no great effect on the life of the state in general.

Much more spectacular was the discovery and opening up of the mines in northern Wisconsin. It was suggested very early by the Hon. Increase Lapham that iron deposits might be found along the Gogebic Range. In 1872 Capt. N. D. Moore was sent out by the La Pointe Iron Company to explore Penokee Gap, and he found hematite under the roots of a fallen tree at the present site of the Colby mine at Bessemer.[40] The Iron Chief Mining Company, which owned the range property on the Wisconsin side of the Montreal River, was organized in 1876 and began operations in 1878. The ore was high grade, having 63 per cent to 65 per cent of iron, so that when the first 1,000 tons of ore were shipped to Cleveland in 1884 it attracted attention, and miners and capitalists began to come to the region. Then began the Gogebic "boom." "In 1884 the blazed right of way of the Milwaukee, Lake Shore and Western Railway became the main street of Ironwood, Michigan,"[41] which two years later was a city of 4,000 inhabitants. Hurley, Wisconsin, a village of a few log houses, became a city of brick buildings in an amazingly short time; and Bessemer grew with equal rapidity. A hundred or more companies were selling stock at high prices, railroads were projected into the region, and 15,000 people were soon on the range.[42]

The Aurora mine shipped 5,256 tons of ore in 1885 and 100,000 tons the next year. In 1886 the Colby shipped 300,000 tons. The net income on 100,000 tons of this ore was $190,000.[43] One million tons of ore were shipped in one season from the Norrie mine.[42] In spite of the fact that there were large quantities of high-grade ore in the region, more money was put into most of the mines than ever came out of them, and many people suffered large financial losses in the crash of 1887, when speculation ceased.

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[38] Chapman, S.: Handbook of Wisconsin, 2d ed., 1855, p. 63.
[39] Geology of Wisconsin, Vol. I, p. 613.
[40] Wisconsin in Three Centuries, Vol. IV, p. 226.
[41] *Ibid.*, p. 227.
[42] Thwaites, R. G.: Wisconsin, p. 294.
[43] Wisconsin in Three Centuries, Vol. IV, pp. 232–233.

In time the speculators were succeeded by legitimate miners who still get a good production of iron from the Gogebic mines, although these mines do not yield the quantity of marketable ore that is obtained from the Mesaba Range of Minnesota.

The discovery of the Florence mines on the Wisconsin side of the Menominee River in 1873 [44] was followed by the rapid settlement and development of the Menominee Iron Range region. Within a very few years what had been almost an unbroken wilderness was dotted with thriving towns, and the rumble of the ore trains could be heard almost constantly. Ore shipments began in 1877 and reached 592,288 tons in 1880.[45] While the iron industry has not had so fundamental an influence on the history of the state as has the lead industry, it has served to populate and develop with great rapidity certain portions of the northern part that, without it, would have remained an unbroken wilderness for many years longer than they did.

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[44] Nursey, W. R.: Menominee Iron Range, 1891.
[45] Geology of Wisconsin, Vol. I, p. 84.

(To be continued)

DR. KOCH-GRÜNBERG'S EXPLORATIONS IN THE NORTHERN AMAZON BASIN AND THE GUIANA HIGHLANDS.

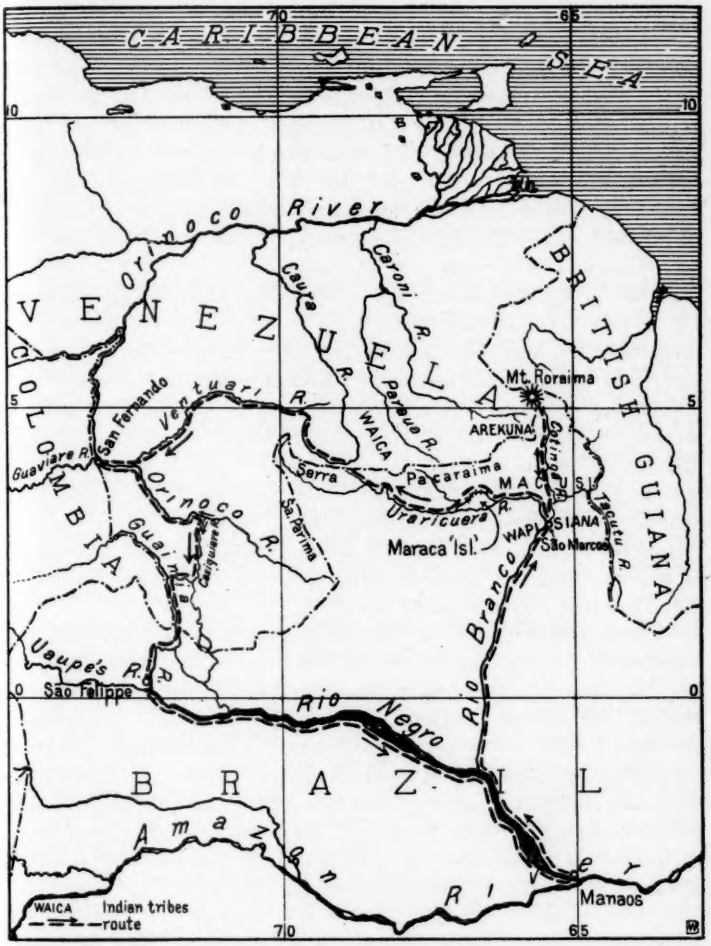
Details are now available of the last expedition of this well-known ethnologist of the University of Freiburg (*Zeitschr. der Gesell. für Erdkunde zu Berlin*, 1912, No. 1, p. 63, No. 7, pp. 535-536, and 1913, No. 4, pp. 311-312).

Leaving Manaos at the junction of the Amazon and Rio Negro in April, 1911, Dr. Koch-Grünberg ascended the latter to its largest tributary on the left, the Rio Branco. The latter he ascended, as well as one of its source streams, the Cotinga, which continues in the same general direction as the Rio Branco, and thereby reached the district where the boundaries of Brazil, Venezuela, and British Guiana meet. This region he explored in detail from July to November, ascending Mt. Roraima on October 7. The journey from the mouth to the head of the Cotinga gave him opportunity to study the Indian tribes native to the district, viz., the Wapisiana, Macusi (Macuchi), and Arekuna.

Returning to below the mouth of the Cotinga, to the small settlement of São Marcos at the junction of the Uraricuera and Tacutu Rivers, which, together, may be considered to form the Rio Branco, Dr. Koch-Grünberg, on November 21, 1911, began the ascent of the Uraricuera, which flows in a generally eastern direction. About 75 miles above its mouth the river separates into two arms which enclose the "island" of Maraca, 50 miles long and 20 miles wide. Above this point the river was hardly known. Dr. Koch-Grünberg followed the north arm, which is characterized by continuous rapids and falls, the Urumamý Falls being over 90 feet high. At this place Indians were met with who had never seen a white man, members of primitive tribes inhabiting the upper courses of the Uraricapará and Paraua Rivers. The former is a left affluent of the Uraricuera rising in the Serra Pacaraima and flowing into the Uraricuera just below Urumamy Falls; the latter rises on the northern slopes of the Serra Pacaraima, flows north, and, through the Caroni River, of which it is a left affluent, debouches into the lower Orinoco.

Above the "island" of Maraca, Dr. Koch-Grünberg continued up the Uraricuera to a left affluent in about 68½° W. which led him over the watershed into the drainage basin of the Caura, which

parallels the Caroni to the west in flowing into the Orinoco. Prior to crossing this watershed Indians of the Shirianá and Waica tribes were met with. They stand very low in the scale of development,



Sketch Map showing Dr. Koch-Grünberg's Route in the Northern Amazon Basin and the Guiana Highlands, 1911–13. Scale, 1: 12,700,000.

have no fixed abode, and are identical with the savage Guaharibos inhabiting the Serra Parima and the sources of the Orinoco.

From the drainage basin of the upper Caura River a second watershed was crossed in May, 1912, leading to the sources of the Ventuari River which flows west into the Orinoco above its meridional course. As the rainy season, with its attendant inclemency in this relatively elevated region, had in the meantime set in, the journey was interrupted here and some months were spent with the Ihuniana Indians inhabiting this district. Although at first friendly, their attitude at the end became so hostile that Dr. Koch-Grünberg had difficulty in inducing any of them to guide him to the Orinoco. Succeeding in this finally, he started on November 6, 1912, and slowly worked his way down the Ventuari from one Indian settlement to another, reaching the Orinoco on January 1, 1913, and San Fernando de Atabápo, at the confluence of the Guaviare and the Orinoco, on the next day.

This practically ended the journey of exploration, although the return to civilization followed a route by no means frequented. Leaving San Fernando about January 16, Dr. Koch-Grünberg ascended the Orinoco to the Casiquiare and followed this connecting link between the Orinoco and Amazon systems—to which Humboldt first called attention—and the Guainia to the Rio Negro at São Felippe, his headquarters during his expedition up the Uaupés in 1903–1905 (see *Bull.*, Vol. 42, 1910, pp. 61–62), which was reached on February 21. Continuing down the Rio Negro he arrived, on March 15, at Manaos on the Amazon, which is a port of call of trans-Atlantic steamers, and thus established contact again with the outer world.

The scientific results of this important journey may be summarized as follows: survey of the whole route, parts of which, as for instance the course of the Ventuari, had never been surveyed before; continuous observations of temperature and atmospheric pressure; 1,000 photographs and many cinematograph pictures; 89 phonographic records of native songs and music; ethnographical, botanical, entomological, and geological collections; detailed studies of more than 21 Indian languages, some hitherto unknown; transcriptions of numerous texts, myths, and legends, and detailed notes on the customs and beliefs of various tribes.

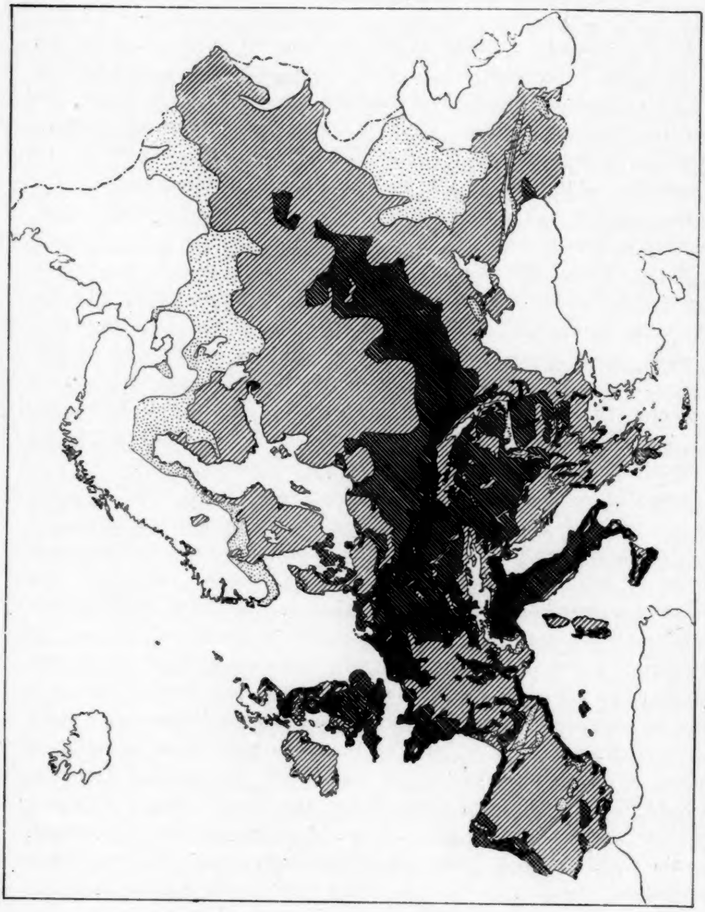
A NEW DENSITY OF POPULATION MAP OF EUROPE

By MARK JEFFERSON

In the January number of *Petermanns Mitteilungen* (Vol. 59, I, 1913, pp. 7–11, with Pl. 2) Dr. Weise publishes a painstaking and extremely interesting new map of the distribution of population densities in Europe. Despite his modest disclaimer it must certainly be regarded as *the* map for its continent. Much of the interest lies in the presumable inclusion of the new materials of the censuses of 1910–11 and much in the considerable detail with which the map is drawn.

Some idea of the result may be had from the accompanying sketch in black and white, which has been traced and reduced from Dr. Weise's map, with a simplification of his twelve colors or shades of color to five grades. His shades are divided at densities of 0.1, 1, 10, 25, 50, 75, 100, 150, 200, 300, and 500 people to a square kilometer, those of the present sketch in round numbers at 2½, 25, 125, and 250 per square mile, as in the writer's " Anthropography of North America " (March *Bulletin*, pp. 161–180).

One distinct feature, the sparseness to absence of population on the Scotch and the Scandinavian highlands, as well as along the crest of the Pyrenees, the Alps, the Carpathians and the Caucasus, comes out plainly on both maps. On Dr. Weise's map there are two shades here, yellow and orange, that pick out these waste places with great distinctness. The great positive feature of the map is the strip of manufacturing and city population from the Rhine mouth eastward along the fiftieth parallel at the foot of the moderate mountains of Central Europe into southern Russia, at a point south of Kiew. A great arm of the same very dense population strikes off southward along the valley of the middle Rhine to include for its southern termination the Swiss Alpine foreland between Lakes Constance and Geneva. Just beyond the Alps, again, lies the third and last of the great European masses of very dense population, namely, in the Po valley and along Italy's Adriatic border—no longer a seat of great manufactures but of an intensive, semi-oriental agriculture. Besides these great masses, each smaller one, too, is full of suggestion to the student, as the London basin, the English Midlands, the south Welsh coalfields and the Scotch Lowlands. The centrifugal tendencies, furthermore, of the popu-



Map of the Density of Population of Europe, based on the map by L. Weise (*Petermanns Mitteilungen*, Vol. 59, I, 1913, Pl. 2). Scale, 1: 42,000,000. Density grades per square kilometer: black, 100–500 inhabitants and more; bars, 50–100; lines, 10–50; dots, 1–10; white (within political Europe), 0–1.

lations of France and the Iberian Peninsula are strikingly contrasted with the centripetal ones of Scandinavia about the Baltic entrance.

With regard to the denser populations Dr. Weise's colored map does not so well bring out these relations, for his color scheme is not well graded to the intensity of the phenomena represented, strong, striking colors being used for very moderate population densities, such as purple for the density of 50–75 to the square kilometer, while an inconspicuous slaty gray (on the legend an olive green) stands for the double density 100–150. Another purple on the legend, a little lighter, perhaps, stands for 200–300. On the map it appears as a quite different shade, very much lower in color value than the red that represents 20–25 people to the square kilometer. Dr. Weise is not one of those geographic sinners who use any color for any step in a graded scheme of intensities, only he has so many grades that he makes impossible the desired "Anschaulichkeit und Übersichtlichkeit" (clearness and legibility?). The fact is, so much detail on a small scale map is well-nigh impracticable, though Germans have done color printing so wonderful that they might have devised twelve better graded shades than these. The present venture is so variegated with colors that are almost meaningless that it is simply a storehouse of facts of great interest that must be laboriously dug up from map and legend. Yet withal it is a work to be very grateful for.

The paper on the representation of population densities for Europe, which accompanies the map, is not very closely related to it, being full of refinements that cannot possibly be applied to a map on the scale used, 1:10,000,000. Nor does it give a satisfactory account of the method of drawing the map. The author proposes about 500 square kilometers for his unit area. He would like to calculate his densities for that unit, but his statistics did not allow it. What smallest units he was able to use in the various countries he does not state. It would be of very great interest to know.

As near as the reviewer can make out, cities are to be located on the map if their density of population, *calculated to an assumed uniform area of 5,000 square kilometers each*, exceeds a fourth of the density of the district within which the city lies. In that case the total city population is subtracted from that of the district before calculating the density for this latter. In practice, however, all the cities that were already on the Stieler map of Europe

used as a base remain there " for practical reasons "! So the cities present may not all have been deducted.

What is said about drawing boundaries between different densities is also somewhat vaguely stated. An example or two would have helped greatly. How, for instance, did he fix the boundaries of the purple tint that includes Berlin and the lower Oder? So smooth a line is of course generalized. On this scale generalization is inevitable. But just what statistical units did he use, what assumptions were made, how much personal equation is there is the generalization? So, too, how shall we interpret the tints and boundaries? For us, living so far away it is strange to see the Kurische Nehrung more densely settled than the coast east and west of it. It seems to share the density of its hinterland. Is this a real equality of density of settlement or only some sort of equivalence? It is conceivable, for instance, that scattered fishing hamlets on the reef might give a numerical equivalence of population to an evenly distributed farm country inland.

This is the sort of thing that the general, small-scale map can never show. Here all Dr. Weise's refinements of theory of making the map express everything are wasted. A map on a larger scale would show easily what on this scale must be reserved for the printed commentary that should go along with the map. This printed commentary could give us the rules of interpretation as far as the map maker knows them from the ground or from the more detailed figures before him.

A NEW MAP OF THE AMERICAN SAMOAN ISLANDS: FURTHER COMMENT

In response to an invitation to comment on the map of the American Samoan Islands, by Dr. Kurt Wegener, published in *Petermanns Mitteilungen* (cf. Pl. 40, Vol. 58, I, April, 1912), which was reproduced and discussed in the *Bulletin* (Vol. 45, 1912, No. 7, pp. 506-512), Commander W. M. Crose, Governor of American Samoa, has had the kindness to send the following reply, which is published with the permission of the Navy Department:

GOVERNMENT HOUSE

PAGOPAGO

AMERICAN SAMOA

December 4, 1912.

Sir:

Concerning your letter of August 20th, and your article in the Bulletin of the American Geographical Society entitled "A New Map of the American Samoan Islands," I would state that I have given your article careful consideration and you may be interested in the following comments.

Dr. Kurt Wegener came to Tutuila in a motor boat in the month of December, 1910. In Tutuila he landed only at PagoPago Harbor. He went from PagoPago to Tau in Manua, attended by the local pilot, Captain Steffany, and was in Manua not over three days. I am sure that Dr. Wegener did not mean to give the impression that his survey was anything more than a reconnaissance because he had no means of making any other kind of a survey, and his instruments must have been inaccurate.

The Hydrographic Office has had no good opportunity to make a survey of the islands of American Samoa, and has apparently not deemed it worth while to correct chart No. 90 from the results of surveys of PagoPago Bay and Leone Bay, and other surveys of harbors sent in from time to time.

It is well known that chart No. 90 is not correct in many particulars. No reliance can be placed upon the contours shown upon that chart. The contours shown upon the charts submitted by Dr. Wegener, while not accurate, are much more nearly correct than those on chart No. 90. The mountain ridges are about as shown by his chart, but he is mistaken in making a flat plain on the southern peninsula, showing only cliffs at Tongapui [Fanga Pui] and Vaitonga. About in the middle of the land which is shown as a plain is a hill, 420 feet in height, named Logotala, with two other hills, 100 feet less in height, southwest of it. These hills are very plainly seen from seaward.

An unpublished map of American Samoa (prepared in 1909 from the results of careful observations made by officers of the ships of the Pacific Fleet)* shows the contour lines fairly accurately, but does not show the coast lines accurately. Transposition of chart No. 2563 of PagoPago Harbor and chart No. 2637 of

* To an inquiry with regard to this map Governor Crose replied that it is not available in any form and is not likely to be published at all.—Asst. Ed.

Leone Bay on to chart No. 90, using the latitude and longitude of the latter chart as correct, will give a fairly accurate coast line of the island, although the whole western end of Tutuila must be extended to the westward in order to make it agree with the new line of Leone Harbor. Leone Point as shown in chart No. 90 is entirely wrong. It does not extend to the westward as shown, but it is more pronounced than shown on Dr. Wegener's chart, where he gives it the name of Tuaulu. It is probable that when the Hydrographic Office learned from the new chart of Leone Bay that Leone Point was incorrectly placed in latitude and longitude it gave notice of the new position of the Point, but failed to give the very necessary notice that the whole shore line of Leone Bay should likewise be moved to the southward and westward.

The new Hydrographic Office chart of PagoPago Bay is of course correct, and Dr. Wegener's map is wrong.

I am unwilling to accept the results of Dr. Wegener's survey of the island of Aunuu pending a proper survey of that island. The island is not circular, and on its south side it has a small bay which is shown on the unpublished map of 1909, and which bay the natives call "Faamulivai." Chart No. 90 shows the high land of Aunuu improperly placed, as it should be on the eastern end.

Dr. Wegener is in error in stating* that Pola Island (Vatia) continues the northeastern trend of the spur on the north shore of Tutuila. From observations made four days ago I find that Vatia Island extends north and south, as shown on the Wilkes survey, and that the ridge extending northeast and southwest makes an abrupt curve at this place.

From reading descriptions of the present volcanic eruption in the Tongan Islands, in the island of Niuafou, where craters are very numerous and appear within a few hundred yards of each other, it would seem that some such condition of eruption must have taken place in Tutuila. This Vatia Island seems to be part of a large crater, with other craters not far distant.

To note some other inaccuracies:

Maloata [village on western part of northern shore of Tutuila] is situated between Fagalii and Fagamalo, and, stretching back from Maloata, is a deep fertile valley.

Vailoa in Leone Bay is not on the coast but is inland.

Taputimu [near Leone Bay] is eastward of Tuaulu.

In general the villages between Leone and Nuuuli are incorrectly shown. Iliili is not on the main road but considerably to the southward. Futiga (not Futina) is the first village to the eastward of Leone, and Malaeloa lies to the northward and westward of Futiga and off the direct trail.

Onenoa [on northern shore at eastern end of Tutuila] (not on chart No. 90) is further to the eastward than shown on Dr. Wegener's map.

Tula, on the eastern coast, is further to the northward. Only the extreme end of Aunuu can be seen from Tula. It is correctly shown on chart No. 90, as is the village of Alao, which faces east and is incorrectly placed on Dr. Wegener's map.

I find the same fault with Dr. Wegener's map as in chart No. 90 concerning the use of the letter "n" before the letter "g," which is not correct either in Samoan or English spelling. The "g" in Samoan has the sound of "ng" as in "singing," not "ng" in "Bengal," which latter pronunciation might easily be adopted by

* Dr. Wegener did not make this statement in the text; his map thus represents conditions, however.—Asst. Ed.

one seeing the name "FagaToga" (FangaTonga). The villages so spelled incorrectly are as follows: PagoPago, Fagatoga, Fagaalu, Faganeanea, Tafuna, Vaitoga, Seetaga, Fagalii, Fagamalo, Fagasa, and Fagaitua.*

Referring to the discrepancies in Dr. Wegener's map of the islands of Manua, I believe him to be mistaken in the relative size of the islands of Ofo and Olosega compared with the island of Tau, the last named island being much greater in size than the other two. He is, however, correct in stating that the southernmost point of Olosega extends much farther to the south than is shown on chart No. 90, and it is a fact that the island of Tau cannot be seen from the village of Olosega.

It is not believed to be proper to make further criticism of Dr. Wegener's map of Manua until I have again visited those islands, or until more complete surveys have been made.

You are correct in emphasizing the necessity for another survey of the islands of American Samoa—which name has now been officially adopted by the Navy Department for the "Island of Tutuila and all those islands of the Samoan Group lying east of the one hundred and seventy-first meridian West Longitude."

Very respectfully,

(Signed) W. M. Crose,
Governor.

Assistant Editor,
Bulletin of the American Geographical Society.

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* With regard to the pronunciation and spelling of Samoan names see also "Geographical Nomenclature of American Samoa" by Wm. Churchill, in the March *Bulletin* (Vol. 45, 1913, No. 3, pp. 187–193).—Asst. Ed.

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1902	Acheson, Edward G.
1902	Ackerman, Ernest R.
1892	Adams, Cyrus C.
1903	*Adams, Edward D.*
1912	Adams, Henry S.
1891	Agar, John G.
1906	Agassiz, G. R.
1904	Agens, Frederick G.
1909	*Agnew, Cornelius Rea.*
1909	*Agnew, George B.*
1898	*Aldrich, Mrs. James Herman.*
1898	Alexander, Harry, E.E., M.E.

Date of Election.

1888 Alexander, John Franklin.
1903 Allen, William Porter.
1898 *Allin, F. Brevoort.*
1909 Altschul, Charles.
1904 Amend, Robert F.
1883 Ames, Adelbert.
1897 Anderson, A. J. C.
1890 *Anderson, Arthur A.*
1890 Andreini, J. M.
1906 Andrews, Wm. H.
1905 *Anthony, S. Reed.*
1909 *Appleton, Francis R.*
1898 Appleton, Herbert.
1912 Appleton, William D.
1887 *Archbold, John D.*
1904 Archer, George A.
1904 Arend, Francis J.
1912 *Armour, Allison V.*
1912 Armour, George A.
1911 *Armstrong, Donald, Lieut.*
1912 *Armstrong, Francis Tuttle, Lieut.*
1912 Armstrong, Lyndon K., E.M.
1906 *Armstrong, Samuel T., M.D.*
1912 Ashmead, Percy Herbert.
1874 *Astor, William W.*
1909 Auchincloss, Samuel Sloan.
1910 *Avery, Samuel P.*
1899 *Aycrigg, B. Arthur.*
1897 Ayer, James C., M.D.
1897 Bacon, Selden.
1909 *Bailey, Frank.*
1904 Baker, A. G.
1902 *Baker, B. N.*
1912 Baker, Hugh Potter.
1899 Baker, O. M.
1900 *Balch, Edwin S.*
1912 Baldwin, Charles A.
1881 *Baldwin, Edwin.*
1874 *Baldwin, Townsend B.*
1899 Baldwin, William D.
1888 *Bancroft, H. H.*
1912 Barber, Herbert.
1912 Barber, Thomas H.
1882 *Barger, Samuel F.*
1889 Baring, Thomas.
1906 Barkley, Charles B.
1898 Barnes, Chas. J.
1912 Barnes, Edward W.
1905 *Barney, Edgar S.*
1882 Barney, N. C.

Date of Election.

1906 Barrett, John.
1904 Barringer, Daniel Moreau.
1899 *Bartow, Charles S.*
1911 Bass, William F.
1910 *Batchelor, Miss Rosa M.*
1912 Bauer, L. A., Ph.D.
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1911 Bayly, Miss Mura.
1912 Beam, William B.
1904 Beaman, George Herbert.
1904 Beaman, Mrs. Charles C.
1908 Beck, Fanning C. T.
1886 Beddall, Edward F.
1912 Beede, Joshua William, Ph.D.
1875 Beekman, Gerard.
1874 Belding, Milo M., Sr.
1897 Belding, Milo M., Jr.
1891 Belin, Henry, Jr.
1900 *Bell, Betrand F.*
1912 Bell, Edward.
1897 Bell, Dr. Ralcy H.
1905 *Belmont, Perry.*
1911 Benjamin, Eugene S.
1909 Benjamin, Miss Ida.
1868 Bennett, James Gordon.
1906 Bennett, John H.
1906 Berner, Charles E.
1908 Bernheimer, Adolph L.
1903 *Bernheimer, Charles L.*
1912 Berolzheimer, Philip.
1890 Bertschmann, J.
1886 Berwind, Edward J.
1910 *Betts, Samuel R.*
1869 Bickmore, Prof. A. S.
1889 *Bigelow, Poultney.*
1909 Bigelow, Dr. William Sturgis.
1906 *Billings, Richard.*
1913 *Bingham, Prof. Hiram.*
1893 Birdsall, Mrs. W. R.
1905 Bishop, Heber R.
1905 Bissell, Clinton T.
1906 Blair, C. Ledyard.
1898 Blake, Theodore A.
1912 Bliss, Ernest C.
1901 Bliss, William H.
1910 *Blumenthal, George.*
1891 Bogue, Virgil G.
1909 Bond, F. E.
1905 Bond, Stephen N.
1884 *Bonner, G. T.*

Date of Election.

1912 Bonnett, Charles P., C.E.
1908 Boocock, Murray.
1904 *Bookman, Samuel, Ph.D.*
1899 Booraem, John V. V.
1886 Bouvier, M. C.
1902 *Bowditch, Charles P.*
1900 *Bowdoin, George S.*
1904 *Bowdoin, Temple.*
1886 Bowers, John M.
1883 *Bowne, Walter.*
1909 Boyd, James.
1890 *Brackenridge, George W.*
1904 Bradford, Sidney.
1912 Brady, Cyrus T., Jr.
1897 *Brainard, Col. David L.*
1912 Braine, L. F.
1912 Braman, Chester A.
1912 *Brewster, Frederick F.*
1904 Brewster, George S.
1902 *Brewster, Robert S.*
1909 Brice, W. Kirkpatrick.
1886 Bridgman, Edward C.
1905 Briscoe, Willis A.
1912 Bristol, John I. D.
1903 Brizse, Charles N.
1911 *Brokaw, Wm. Gould.*
1889 *Bromberg, Frederick G.*
1890 Brooker, Chas. F.
1904 *Brooks, Alfred H.*
1906 Brooks, John F.
1912 Brown, Prof. Charles Wilson.
1903 Brown, Col. Franklin Q.
1878 Brown, J. Romaine.
1911 Brown, Stephen Pearson.
1910 Brown, W. C.
1904 *Brown, William L.*
1909 Browne, Belmore H.
1875 Brownell, Silas B.
1910 Browning, J. Hull.
1874 *Brownson, Rear-Adm. Willard H., U.S.N.*
1901 *Bruce-Brown, William.*
1904 Bruggerhof, F. W.
1912 Brünnow, Rudolph E.
1912 Bryce, George, D.D., LL.D.
1902 *Buchanan, James Isaac.*
1911 Bucknell, Mrs. William.
1913 Budd, Henry A.
1905 Buel, John L., M.D.
1900 Bulkley, Justice L.

Date of Election.

1903 *Bunker, George R.*
1908 Burden, James A.
1902 *Burrage, Albert C.*
1902 *Burrage, Albert C., Jr.*
1902 *Burrage, Russell.*
1903 Burton, Dr. A. E.
1906 Butler, Charles Stewart.
1909 *Cadwalader, John L.*
1912 Cahn, Arthur L.
1911 Cahoone, W. M.
1897 Cameron, W. L.
1888 Canda, Charles J.
1912 Canfield, R. Bishop, M.D.
1887 Cannon, H. W.
1908 *Cannon, Henry Brevoort.*
1910 Cannon, James G.
1884 Carey, Henry T.
1912 Carleton, Mark A.
1904 *Carnegie, Andrew.*
1901 *Carnegie, George L.*
1904 Carnegie, Thomas Morris.
1912 Carpenter, C. L., C.E.
1889 *Carter, John J.*
1897 Cassard, William J.
1906 Chadbourne, Wm. M.
1913 Chadwick, French E., Rear Adm.
1905 Chaloner, John Armstrong.
1912 Chamberlin, Thomas C., LL.D.
1897 Chambers, Frank R.
1912 Chambers, Talbot R., M.D.
1906 Champ, Wm. S.
1890 Chanler, William Astor.
1905 Channing, J. Parke.
1897 *Chapin, Chester W.*
1883 *Chapman, Henry E.*
1911 Chapman, Robert Hollister.
1910 Chappell, Howard F.
1886 *Chauncey, Elihu.*
1911 Chew, Benjamin.
1906 Chew, Beverly.
1909 Chisolm, B. Ogden.
1888 Chisolm, George E.
1906 Choate, Joseph H.
1913 Church, Franklyn H., M.D.
1897 Church, George H.
1884 *Claflin, John.*
1912 Clapp, Frederick G.
1891 Clapp, George H.
1905 Clark, Alzamore H.
1912 Clark, Ambrose R.

Date of Election.

1913 Clark, Arthur H.
1908 Clark, Charles A.
1905 Clark, Frank E.
1887 Clark, Jefferson.
1912 Clark, John William.
1901 Clark, William A.
1882 *Clarkson, Banyer.*
1889 Clausen, George C.
1883 Clews, Henry.
1883 Clyde, William P.
1890 Cockcroft, Miss Mary T.
1897 Coffin, C. A.
1886 Coffin, Edmund.
1891 Cogswell, W. B.
1901 Cole, George Watson.
1910 Collier, Robert J.
1912 Colt, Mrs. Elizabeth.
1886 *Colvin, Verplanck.*
1897 Combe, Mrs. William.
1897 *Comstock, Frederick H.*
1889 Comstock, George Carlton.
1884 *Connor, W. E.*
1898 Cook, Eugene B.
1894 Cook, Frederick A., M.D.
1893 Coolidge, J. Randolph.
1912 Cordley, Frank R.
1903 Cornell, Russell R.
1902 Corning, Christopher R.
1886 Corthell, Elmer L.
1905 Coutant, Richard B., M.D.
1905 Cowee, Harvey D.
1899 *Cox, John Lyman.*
1902 *Coxe, Eckley B., Jr.*
1912 Cram, Ralph Adams.
1912 Crampton, Henry Edward, Ph.D.
1889 *Crane, Charles R.*
1906 Crane, George F.
1902 *Crane, Zenas.*
1887 *Cranitch, William I. A.*
1905 Crile, George, M.D.
1874 Crosby, J. Schuyler.
1913 Crosby, Nicholas E.
1901 *Crozier, Capt. William.*
1903 Cuntz, J. H.
1911 Currier, Enoch Henry.
1913 Curtis, Charles B.
1901 *Curtis, William Edmond.*
1912 Cuyler, Thomas DeWitt.
1906 Dalton, H. G.
1871 Daly, Joseph F.

Date of Election.

1892 Daniels, W. L.
1912 Darling, John Henry, C.E.
1906 Darlington, Thos., M.D.
1912 Davenport, William B.
1913 Davie, Preston.
1875 Davies, Julien T.
1906 Davis, Charles Henry.
1906 Davis, Daniel A.
1884 Davis, Howland.
1877 *Davis, Joseph Beale.*
1905 *Dean, Mrs. Bashford.*
1880 *Deane, John H.*
1909 *De Coppet, Edward J.*
1901 De Coppet, Henry.
1912 De Courcey-Burnett, Norman L.
1910 Deen, Mrs. Emile Andrews.
1895 De Kalb, Prof. Courtenay.
1900 *Delafield, Albert.*
1874 Delafield, Maturin L.
1909 *Delano, Warren, Jr.*
1890 Dellinger, Charles F.
1912 Demming, Col. Henry C.
1906 Denholm, Wm. J.
1901 Dennis, Rev. James S.
1899 Dennis, John B.
1911 Dennis, Samuel S.
1905 *de Peyster, Frederic Ashton.*
1910 Dexter, George B.
1903 Dick, Evans R.
1894 Dieterich, Charles F.
1897 Dillingham, Edwin R.
1905 Dimmick, J. Benjamin.
1905 Dimock, George E.
1904 Dix, Samuel M.
1881 *Docharty, Augustus T.*
1897 Dodge, Rev. D. Stuart.
1896 Dodge, Prof. Richard E.
1893 Dodson, Robert Bowman.
1889 *Donald, Peter.*
1912 Doscher, Henry.
1897 Doughty, Mrs. Alla.
1884 *Douglas, James.*
1903 Douglass, R. D.
1905 *Dowling, Robt. E.*
1910 Drayton, J. Coleman.
1912 Drexel, John R., Jr.
1880 Du Bois, Frederick N.
1874 *Du Bois, William A.*
1898 Dunham, Edward K., M.D.
1905 Dunning, Clement S.

Date of Election.

1911 Dunning, Wm. B.
1906 Du Pont, Alexis I.
1912 *Du Pont, Coleman.*
1889 Du Pont, Col. H. A.
1909 Du Pont, P. S.
1912 *Du Pont, William.*
1901 *Durand, John S.*
1889 Durkee, Eugene W.
1912 Dutt, I. N., B.A.
1894 Duvall, William C.
1889 Dwight, Jonathan, Jr., M.D.
1913 Dwight, Mrs. M. E.
1912 Dwight, Stanley.
1909 Dyer, Frank L.
1886 *Easton, Robert T. B.*
1905 Eaton, Charles Edwin.
1910 Eaton, Frederick H.
1902 Eberstadt, Edward F.
1905 *Eckert, Thomas T., Jr.*
1906 Eddy, Spencer.
1882 Edwards, J. Pierrepont.
1887 Egleston, Melville.
1912 Eidlitz, Otto M.
1897 Eimer, August.
1901 *Eldert, Cornelius.*
1901 *Eldridge, Lewis A.*
1879 *Elliott, Samuel.*
1886 Ellis, George W.
1882 *Ellis, Wilbur Dixon.*
1903 Ellis, William H.
1913 Elsberg, Charles A., M.D.
1913 Emanuel, John H., Jr.
1882 *Emerson, John W.*
1912 Emery, W. L.
1909 Emmet, C. Temple.
1904 Emmons, Arthur B.
1903 Endicott, William C.
1883 Eno, Amos F.
1906 Entz, George Gilbert.
1912 Eppley, Marion.
1903 Eskesen, Eckhardt V.
1906 Estabrook, A. F.
1891 Eustis, W. E. C.
1909 *Evarts, Allen W.*
1913 *Everett, Edward.*
1906 Evers, Cecil C.
1909 Fabbri, Alessandro.
1905 Fahs, Charles H.
1890 Fairchild, Chas. S.
1892 Fairchild, Samuel W.

Date of Election.

1902 Fairleigh, David W.
1875 Fargo, James C.
1905 *Farish, John B.*
1913 Farmer, Arthur John.
1912 Farnham, Amos W.
1901 *Farnsworth, William.*
1874 Farragut, Loyall.
1912 Farrand, Max.
1890 *Fearing, Daniel B.*
1909 *Fearing, George R.*
1898 *Ferguson, Henry.*
1888 *Ferguson, Walton.*
1906 Ferry, Mansfield.
1913 *Field, Wm. B. Osgood.*
1904 Fish, Charles Henry.
1908 Fisk, Arthur Lyman, M.D.
1902 Fisk, Pliny.
1907 Fleischmann, Max C.
1889 Flint, Chas. R.
1901 *Flower, Frederick S.*
1912 Floyd, C. Harold.
1906 Floyd-Jones, G. Stanton.
1912 Fluhrer, William F., M.D.
1875 Folsom, George W.
1912 Ford, Frank R.
1875 *Ford, James B.*
1912 Forman, Justus Miles.
1909 Fortescue, Granville R.
1910 Foshay, P. Maxwell, M.D.
1901 Fowler, Jonathan Odell, Jr.
1906 *Fowler, Thomas Powell.*
1874 *Fox, Austen G.*
1909 Frank, Felix.
1912 *Frasch, Hans A.*
1912 Fraser, George C.
1912 Free, Edward E.
1873 Freedman, John J.
1912 French, John Shaw.
1909 *Frick, Childs.*
1894 Frick, John.
1902 Frissell, A. S.
1906 Frye, Jed.
1875 Fuller, Charles D.
1903 *Gaff, Thomas T.*
1889 *Gage, E. B.*
1905 Gaines, David H.
1911 Gallaher, H. Palmer.
1913 Gallatin, Albert.
1886 Gallatin, Frederic.
1904 *Gammell, William.*

Date of Election.

1912 Gardiner, Robert A.
1904 Garrett, Robert.
1907 Gartland, George E.
1897 Garver, John A.
1903 *Gates, Isaac E.*
1910 Gates, Rev. Milo Hudson.
1913 Gawtry, Lewis B.
1891 Gay, Edward.
1879 Gay, Joseph E.
1913 Gayler, Julius F.
1905 Geer, Robert C.
1868 *Gerry, Elbridge T.*
1909 Giddings, Franklin H.
1906 Gielow, Henry J.
1901 *Gilbert, Clinton.*
1889 Gilbert, G. K.
1893 *Gilbert, J. H. Grenville.*
1911 *Gillespie, Lawrence Lewis.*
1909 Goddard, Conrad G.
1909 *Goelet, Robert.*
1897 Golding, John Noble.
1910 Goldman, Henry.
1904 *Goodhart, Philip J.*
1898 *Goodnow, Harold P.*
1900 Goodridge, F. G., M.D.
1886 *Goodwin, James J.*
1912 Gordon, Frederick W.
1887 Gould, George J.
1905 Granbery, Julian Hastings.
1905 Grant, Madison.
1904 *Graves, George Coe.*
1906 Green, Francis C.
1901 Green, Pinckney F.
1883 *Greenough, John.*
1892 Greenwood, Langdon.
1909 Griffin, Francis B.
1909 Grinnell, George Bird.
1897 Gruber, Abraham.
1912 Guernsey, Henry William.
1903 Guggenheim, Simon.
1909 Guiteras, Dr. Ramon.
1904 *Gunther, Bernard G.*
1886 *Gunther, Franklin L.*
1891 Haas, Kalman.
1906 *Hadden, John A., Jr.*
1874 *Haines, John P.*
1906 Hall, Harry Alvan.
1903 Hamilton, Edmond H.
1905 Hammond, John Henry.
1913 Hammond, Ogden H.

Date of Election.

1909 Hanna, Charles A.
1904 Hansmann, Carl A.
1888 Harbeck, Charles T.
1888 Hard, Anson W.
1905 Hardenbergh, William P.
1900 Harding, Edward.
1912 Harding, Newton H.
1900 Hardley, J. Wheeler.
1909 *Harkness, Charles W.*
1912 *Harrah, Charles J.*
1912 Harrington, Miss Mary E.
1912 Harris, Sidney.
1911 Harris, W. R.
1913 Hart, Arthur W.
1906 Hart, Richard P.
1897 Hart, Walter T.
1912 Hasslacher, Jacob.
1904 *Haupt, Louis, M.D.*
1859 *Havemeyer, John C.*
1902 *Havemeyer, William F.*
1894 Haven, J. Woodward.
1909 Hawxhurst, Robert, Jr., C.E.
1909 Hayes, S. W.
1891 Hazard, Frederick R.
1897 *Hearn, George A.*
1913 *Hearst, William R.*
1883 *Hebert, Henry B.*
1902 Hedge, Frederic H.
1903 Heimann, Julius.
1901 Hentz, Henry.
1899 *Herbert, John W.*
1909 Herbert, William.
1912 Herzig, George B.
1904 *Hess, Selmar.*
1904 *Heurich, C.*
1903 *Hewitt, Peter Cooper.*
1900 Hewlett, Walter Jones.
1901 Heydt, Herman A.
1912 Hice, Richard R.
1906 Hickey, James H.
1912 Higbie, James S.
1906 Higginson, Adm. Francis J., U.S.N., Retired.
1913 Higginson, H. L.
1909 Higginson, James J., Jr.
1894 Hildreth, J. Homer.
1903 Hill, Charles B.
1890 Hill, James J.
1908 Hill, Samuel.
1912 Hills, Thomas McD.

Date of Election.

1904 *Himmelwright, A. L. A.*
1887 Hinchman, Walter.
1903 *Hirsch, Robert B.*
1904 Hitchcock, Mrs. Roswell D.
1904 Hoe, Alfred G.
1913 Hoe, Mrs. R.
1876 Hoes, William M.
1901 Hoffman, Charles F., Jr.
1910 *Hoffman, Samuel V.*
1872 *Holbrook, Levi.*
1909 Holland, Arthur L., M.D.
1913 Hollins, De Ruyter M.
1876 Holt, Henry.
1913 Holter, Mrs. Edwin O.
1902 Holton, Henry D., M.D.
1913 Hood, William.
1901 *Hopkins, George B.*
1913 Hornor, Harry Archer, E.E.
1896 *Hotchkiss, Miss Caroline W.*
1912 Hotchkiss, H. Stuart.
1912 *Hovey, Edmund Otis, Ph.D.*
1898 Howell, Maxwell D.
1888 *Hoyt, Henry R.*
1906 Hubbard, Prof. Geo. D.
1906 *Hubbard, John.*
1898 *Hubbard, Robert J.*
1901 *Hubbard, Thomas H.*
1913 Hubbard, Walter C.
1900 Hudnut, Richard A.
1897 Humphreys, Alexander C., M.E.
1911 *Huntington, Mrs. Arabella D.*
1893 *Huntington, Archer M.*
1909 Huntington, Charles P.
1909 *Huntington, Henry E.*
1910 Huntting, Miss Ella.
1909 Hurst, George D.
1889 *Hurtt, Frank D.*
1890 Husted, Seymour L., Jr.
1913 Hyatt, H. William, M.D.
1883 Hyde, E. Francis.
1910 *Hyde, Henry St. John.*
1901 *Hyde, James H.*
1905 Iddings, Daniel W.
1899 Insull, Samuel.
1909 Irving, Cortlandt.
1890 Irving, Walter.
1874 Iselin, Adrian, Jr.
1887 *Isham, Charles.*
1881 *Ives, Brayton.*
1903 Jackson, A. Wendell.

Date of Election.

1897 Jackson, Theodore F.
1886 Jacobi, Abraham, M.D.
1913 Jacobs, Samuel K.
1891 Jaffray, Robert.
1894 James, Arthur Curtiss.
1911 James, Norman.
1890 James, Walter B., M.D.
1891 Jaques, W. H.
1906 Jarves, Deming.
1903 Jarvie, James N.
1879 Jay, William.
1913 Jefferson, John Percival.
1893 Jenkins, Michael.
1912 Jennings, Miss Annie B.
1895 Jennings, Oliver G.
1911 *Jennings, Walter.*
1902 Jessup, Henry W.
1880 *Jewett, George L.*
1906 *Jewett, W. K.*
1881 Johnson, Bradish.
1901 Johnson, Edward C.
1913 Johnson, Thomas H.
1906 *Jones, Charles Landon.*
1906 Jones, Dwight A.
1888 *Jones, Oliver L.*
1909 Judson, Henry I.
1885 Juilliard, A. D.
1901 Julian-James, Mrs. Cassie.
1904 Jungmann, J., M.D.
1898 Kahn, Otto H.
1909 Kammerer, Robert C.
1881 *Kane, Grenville.*
1893 *Kane, Henry Brevoort.*
1913 Kautz-Eulenburg, Miss P. R.
1895 *Kean, Hamilton Fish.*
1912 *Kean, Julian H.*
1908 Keck, Thomas A.
1897 Kemmerer, M. S.
1903 Kemp, James Furman.
1873 *Kennan, George.*
1901 Kennedy, E. G.
1901 *Kennedy, George G., M.D.*
1913 Kennedy, Mrs. H. Van Rensselaer.
1913 Kennedy, Harris, M.D.
1906 Kenyon, Wm. Houston.
1885 *Keppler, Rudolph.*
1903 Kerr, John B.
1883 Kerr, Walter.
1909 Keyes, William Forrest.

Date of Election.

1886 *Kidder, Camillus G.*
1904 Kidder, Edward H.
1897 Kimball, Alfred R.
1883 King, D. H., Jr.
1882 *King, George Gordon.*
1892 King, John Hurtin.
1904 King, W. Nephew.
1913 Kipling, Rudyard.
1901 Kirby, Thomas E.
1881 Kirsch, Louis.
1912 Kissel, W. Thorn.
1913 Knapp, Harry K.
1901 Kohlman, Charles.
1897 Kohn, S. H.
1901 Kohnstamm, Emil V.
1913 Krauskopf, Nathan.
1913 Kruckman, Arnold.
1906 *Kuhn, August.*
1909 *Kunhardt, Henry Rudolph 3d.*
1912 Kunz, George F., Ph.D.
1913 Kuttroff, Adolph.
1913 *Ladd, Walter G.*
1913 Lambert, Adrian V. S.
1910 Lampland, Carl Otto.
1909 Landers, George M.
1895 Landon, Francis G.
1898 Lane, Wolcott G.
1882 Langdon, Woodbury.
1881 *Langdon, Woodbury G.*
1882 Lapham, Lewis H.
1904 *Laughlin, George M.*
1909 Lawrence, Emlen N.
1910 Lawrence, Enoch P., M.D.
1902 Lawrence, John Burling.
1909 Lawrence, William W.
1903 Lawson, Victor F.
1886 *Leete, Charles H.*
1906 *Leffingwell, Rev. C. W., D.D.*
1903 Lehmaier, James M.
1913 *Lehman, Meyer H.*
1909 Leland, Charles H.
1905 Lemon, Dr. J. S.
1913 Leonard, John W.
1909 Le Roy, Edward A., Jr.
1903 Lesher, Arthur L.
1901 *Leupp, William H.*
1904 Levi, Emil S.
1896 *Lewis, Clarence McK.*
1881 *Libbey, William.*
1903 Lincoln, Lowell.

Date of Election.

1905 Lindsey, Edward.
1899 *Lippincott, Henry H.*
1903 Lisman, Frederick J.
1897 *Livingston, Goodhue.*
1897 Lobenstine, William C.
1904 Lodge, Henry Cabot.
1891 Loewy, Benno.
1906 Loines, Stephen.
1912 Long, William S.
1903 *Lorillard, Pierre.*
1878 *Loubat, J. F., LL.D.*
1908 Loughran, Dr. Robert L.
1875 *Low, Seth, LL.D.*
1903 *Low, William G.*
1905 *Lowell, Percival.*
1913 Luther, Miss Agnes Vinton.
1909 Lybrand, William M.
1889 Lydig, David.
1900 Lyman, Frank.
1888 *Lynch, James D.*
1906 Lyon, David H.
1887 McCready, N. L.
1909 McCurdy, Robert H.
1906 McDonald, William.
1903 McDougall, Walter.
1901 *McFarlane, C. T.*
1888 McKeever, J. Lawrence.
1898 McLean, Donald.
1904 *McMillan, William Northrup.*
1903 McWilliams, Daniel W.
1903 Maas, Gustavus.
1905 MacDougall, George R.
1903 *Mackay, Clarence H.*
1912 Mackay, Frank B.
1884 *MacKellar, William.*
1890 Mackey, Charles W.
1898 MacKie, Charles Paul.
1913 MacMillan, Donald B.
1901 Macy, George H.
1901 *Macy, V. Everit.*
1904 Mager, F. Robert.
1899 Mahl, William.
1903 Mann, William D'Alton.
1905 Manning, Charles H., U.S.N.
1874 Marble, Manton.
1895 Marcus, George E.
1913 Markle, Alvan.
1909 *Markle, George B.*
1909 *Marling, Alfred E.*
1888 *Marquand, Henry.*

Date of Election.

1898 Marsh, Joseph A.
1897 *Marshall, Louis.*
1898 Marston, Edwin S.
1910 Martin, Bradley, Jr.
1911 Martin, Fred. Townsend.
1911 Martin, Howard Townsend.
1910 *Martin, Newell.*
1888 *Martin, Oswald J.*
1910 Martin, Dr. Winfred R.
1909 Marwick, James.
1888 *Mason, Alexander T.*
1913 Mason, George Grant.
1901 Mather, Samuel.
1911 Matheson, William J.
1913 Matthes, François E.
1901 Matthews, Albert.
1903 Maxwell, Francis Taylor.
1901 Maxwell, Robert.
1906 Maxwell, William.
1905 Meeker. Stephen J.
1891 Meeks, Edwin B.
1909 Melcher, John S.
1902 *Mellen, Charles S.*
1913 Meloy, Andrew D.
1913 Mendelsohn, Sigmund.
1911 Meredith, Rev. Fred. Charles.
1904 Meredith, William T.
1913 Mersereau, Gail.
1909 Meyer, Eugene, Jr.
1901 Meyer, Harry H.
1897 Millar, George W.
1909 Miller, Francis Trevelyan.
1901 *Miller, Dr. George N.*
1892 *Mills, A. G.*
1913 Mills, Ogden L.
1911 *Mitchell, Albert M. Post.*
1909 Mitchell, Edward P.
1905 Mixer, Frederick K.
1909 Moffat, R. Burnham.
1905 *Mohr, Louis.*
1902 *Monks, John, Jr.*
1913 Monroe, Robert Grier.
1913 Monroe, Will S.
1890 Montant, Alphonse.
1906 Moore, C. Arthur, Jr.
1913 Moore, Frank C.
1906 Moore, Henry Du Bois Bailey.
1904 *Moore, John Bassett.*
1884 *Moore, Joseph, Jr.*
1910 More, Taylor.

Date of Election.

1883 Morgan, E. D.
1906 *Morgan, Frederick G.*
1901 *Morgan, J. P.*
1887 *Morgan, William Fellows.*
1889 Morgan, William H.
1906 Morrell, Joseph B.
1874 *Morris, Henry Lewis.*
1897 *Morris, Mrs. Lewis G.*
1906 Morris, Lewis R., M.D.
1898 *Morris, Newbold.*
1902 *Mortimer, Rev. Dr. Alfred G.*
1908 Mortimer, Edmund.
1907 *Mortimer, Richard.*
1864 *Morton, Levi P.*
1909 Morton, Quincy L.
1910 Mosonyi, Emil.
1913 Mott, Hopper Lenox.
1906 Mullins, Edwin Stanton.
1909 Munsey, Frank A.
1909 Murphy, Franklin, Jr.
1904 Myers, Joseph G.
1888 Myers, Theodore W.
1913 Myers, William S.
1909 Neill, Robert L.
1910 Neilson, John.
1910 *Nesbitt, Abram G.*
1891 Neukirch, Chas.
1910 Nevin, Miss Blanche.
1899 Newbold, Clement Buckley.
1897 *Newell, Frederick Haynes.*
1899 Newton, James S.
1897 Nixon, Lewis.
1912 Norden, Hermann.
1908 North, Arthur Walbridge.
1913 Northrup, William P.
1897 Notman, George.
1888 *Oakes, T. F.*
1898 Obermeyer, Joseph.
1879 *O'Brien, Thomas S.*
1910 Ochs, Adolph S.
1875 *O'Connor, Thomas H.*
1913 Ohern, D. W., Ph.D.
1909 Olcott, Dudley.
1901 O'Leary, H. A.
1909 Oliver, French E., D.D.
1905 *Olyphant, Robert.*
1874 Olyphant, Robert M.
1913 Onativia, J. Victor, Jr.
1875 *Opdyke, William S.*
1893 Operti, Albert.

Date of Election.

1913 Oppenheimer, Henry S., M.D.
1913 O'Reilly, Andrew J., E.E.
1889 Orr, Alexander E.
1901 *Orvis, Charles E.*
1909 *Osborn, Henry Fairfield, LL.D.*
1905 *Osborn, William Church.*
1901 Outerbridge, Dr. Paul.
1896 Owen, James, C.E.
1895 *Owen, Miss Luella A.*
1905 *Packard, Ralph G., Jr.*
1898 *Paget, Almeric H.*
1911 Pam, Max.
1899 *Parish, Edward C.*
1872 *Parish, Henry.*
1905 Parish, Henry, Jr.
1905 *Parker, Herschel C.*
1902 *Parker, James H.*
1913 Parkhurst, Frederic A., M.E.
1905 Parks, C. W., C.E., U.S.N.
1886 Parris, Edward L.
1882 *Parrish, James C.*
1909 Parsons, Charles W.
1882 *Parsons, Mrs. Edwin.*
1905 Parsons, Herbert.
1882 Parsons, John E.
1902 Paton, David.
1897 *Paton, William Agnew.*
1909 Patten, William.
1907 Peabody, Charles A.
1909 *Peabody, George Foster.*
1889 Peck, Charles E.
1906 *Pell, Howland Haggerty.*
1901 Pell, Stephen H. P.
1910 Penfield, Frederic Courtland.
1906 *Penniman, James H.*
1913 *Penrose, Charles B., M.D.*
1890 *Perkins, William H.*
1888 Perry, William A.
1891 Peters, Edward McClure.
1887 Peters, Samuel T.
1903 *Peters, William Richmond.*
1909 Pfeiffer, Curt G.
1906 Phelps, Dr. Gouverneur Morris.
1901 *Phelps, John J.*
1902 *Phipps, Lawrence C.*
1887 *Phoenix, Lloyd.*
1886 *Phoenix, Phillips.*
1889 *Pickering, Edward C.*
1913 Pickering, Henry G.
1895 Pickhardt, Carl.

Date of Election.

1902 Pierce, Henry Clay.
1906 *Pierrepont, R. Stuyvesant.*
1898 Piorkowski, Major A. E.
1913 Piper, Peter Frederick.
1893 *Platt, J. D.*
1906 Platt, Lewis A.
1912 Plimpton, George A.
1890 *Plumb, Edward L.*
1884 *Plush, Dr. Samuel M.*
1913 Polk, William M., M.D.
1912 Pollard, A. Wilder.
1906 Poor, Henry V.
1911 Poor, Ruel W.
1891 *Porter, Henry Kirke.*
1897 Porter, William H.
1909 *Porter, William L.*
1905 *Post, Abram S.*
1884 Post, George B.
1885 *Post, William Henry.*
1890 Potter, Edward Clarkson.
1898 Potter, Frederick.
1901 *Potts, Jesse W.*
1903 *Potts, Thomas.*
1880 Powell, Wilson M.
1909 Pruyn, Frederic.
1886 Preyer, Charles.
1901 Purdy, J. Harsen.
1905 Putnam, Henry St. Clair.
1912 Pyle, James McAlpin.
1894 *Pyne, M. Taylor.*
1898 *Pyne, Percy R.*
1906 *Queen, Emmet.*
1908 *Radford, Harry V., M. Sc., C.E.*
1911 *Rainey, Paul J.*
1903 *Randolph, Evan.*
1868 *Raven, Anton A.*
1905 *Raven, John Howard, D.D.*
1898 *Rawson, Edward Stephen.*
1890 Raymond, Charles H.
1886 *Raymond, Rossiter W.*
1902 Rea, Samuel.
1901 *Rea, Thomas B.*
1902 *Ream, Norman B.*
1912 Reaney, Mrs. Emma L.
1905 Reckefus, Charles V., Jr., M.D.
1903 Reed, Charles.
1912 Reed, William G.
1913 Reeds, Chester A.
1911 Reid, Wallace.
1913 *Reid, Mrs. Whitelaw.*

Date of Election.

1911 Remsen, Charles.
1913 Rey, Emile.
1874 *Reynes, Jaime.*
1903 *Reynolds, James B.*
1882 Rhinelander, Charles E.
1898 *Rhinelander, Miss Serena.*
1886 *Rice, Isaac L.*
1903 Richard, Edward A.
1913 Richards, Eben.
1874 Riker, William J.
1901 Rives, George Barclay.
1872 *Robbins, Chandler.*
1891 Robbins, Miss Harriet L.
1913 Robertson, Albert.
1901 *Robertson, Julius.*
1907 Robinson, Dr. E. S.
1901 *Robinson, Nelson.*
1888 Robinson, William Moore.
1908 Rockwood, Charles G. Jr., Ph.D.
1913 Roddy, Harry Justin, Ph.D.
1903 Roe, Albert S.
1889 *Roelker, Alfred.*
1887 *Rogers, Archibald.*
1905 Rogers, Edward L.
1903 *Rogers, Robert.*
1912 Rollé, Augustus J.
1905 *Roosevelt, Franklin Delano.*
1913 Roosevelt, Theodore, Jr.
1903 Ross, Morgan R.
1913 Rossbach, Jacob.
1911 Runyon, Walter Clark.
1913 Rupp, August.
1910 Rusch, Adolph, Jr.
1897 Rusch, Henry A.
1899 Russak, Frank.
1874 *Russell, Archibald D.*
1889 Ryan, Thos. F.
1913 Sabin, Charles H.
1906 Sachs, Arthur.
1906 Sachs, Paul J.
1905 Sachs, Samuel.
1909 Safe, Thomas Shaw.
1913 Salisbury, Rollin D.
1898 Salomon, William.
1911 *Saltus, J. Sanford.*
1901 *Sampson, Alden.*
1904 Sampson, Charles E.
1910 Sanderson, Edwin N.
1875 *Sandford, Elliott.*
1895 Sands, Robert C.
1886 Satterlee, F. LeRoy, M.D.

Date of Election.

1903 *Satterlee, Herbert L.*
1904 Saul, Charles R.
1913 Sayles, Robert W.
1870 *Schafer, Samuel M.*
1911 Scheftel, Edwin K.
1874 *Schermerhorn, F. Augustus.*
1890 Schernikow, Ernest.
1911 Scheffelin, Schuyler.
1875 *Schiff, Jacob H.*
1902 *Schiff, Mortimer L.*
1903 Schirmer, Rudolph E.
1885 Schmelzel, William R.
1901 Schmid, Dr. H. Ernest.
1905 *Schott, Charles M., Jr.*
1888 *Schultze, John S.*
1882 *Schuyler, Spencer D.*
1902 *Schwab, Charles M.*
1883 Scott, Rufus L.
1911 *Scoville, Robert.*
1906 Scribner, Charles.
1895 Scudder, Moses L.
1905 Scull, Harry.
1909 Seabury, Charles B.
1909 Seaman, Louis Livingston, M.D.
1912 Seaver, Benjamin Frank.
1913 Seligman, Edwin R. A.
1901 Seligman, Isaac N.
1909 *Seligman, Jefferson.*
1903 *Sells, Elijah W.*
1902 Seward, Frederick W.
1898 Seward, Gen. William H.
1893 *Sexton, Edward Bailey.*
1909 Seymour, Morris W.
1905 Shailer, William Griggs.
1897 *Shardlow, Joseph.*
1911 Shattuck, George B., Ph.D.
1903 Shaughnessy, Sir Thomas G.
1913 Shaw, Charles F.
1910 Shaw, Louis Agassiz.
1906 *Shaw, Walter W.*
1897 Sheehy, W. H.
1905 Sheffield, George St. John.
1888 Sheldon, Edwin B.
1888 *Sherman, Charles A.*
1886 *Sherman, George.*
1898 Shillaber, William, Jr.
1876 *Sibley, Hiram W.*
1903 *Siegel, Henry.*
1903 Siegel, Jacob.
1913 Silver, Henry Mann, M.D.
1913 Simmons, George O.

Date of Election.

1903 Simpson, Ernest L.
1911 Simpson, John Boulton.
1910 *Sinclair, Henry A.*
1906 Slater, James.
1913 Slee, J. Noah H.
1910 Sloan, Benson B.
1910 Sloan, Samuel.
1910 Sloan, William S.
1901 Smillie, Charles F.
1890 *Smith, Sir Donald A.*
1902 Smith, Dr. E. Fayette.
1901 Smith, Ormond G.
1910 Smith, Pierre J.
1890 Snow, Elbridge G.
1903 Snow, Fred W.
1909 Solari, Luigi.
1911 Souther, Charles Edward.
1880 *Southwick, Henry K.*
1906 Spangler, Harry A., M.D.
1883 Spence, Lewis H.
1912 Spencer, Mrs. Edwards.
1905 Spencer, Henry B.
1906 Speranza, Gino C.
1905 *Speyer, James.*
1911 *Spingarn, Joel E.*
1909 Spring, Miss Anna Riker
1904 Squires, Grant.
1897 Standish, Myles.
1905 Stanton, Robert Brewster.
1909 Steese, James Gordon.
1911 Stein, Enrico N.
1913 Steinmetz, Charles P., A.M., Ph.D.
1903 Steinway, Frederick T.
1904 *Sterry, John DeWitt.*
1879 Stetson, Francis Lynde.
1887 *Stetson, George W.*
1910 Stetson, John B., Jr.
1879 *Stevens, Frederic W.*
1905 Stewart, John H. J.
1887 Stewart, Lispenard.
1878 Stewart, William Rhinelander.
1901 *Stickney, Charles D.*
1905 Stillwell, Arthur E.
1905 *Stillwell, Louis Buckley.*
1897 Stine, Marcus.
1913 *Stoeckel, Carl.*
1904 Stokes, Anson Phelps.
1892 *Stokes, I. N. Phelps.*
1911 Stokes, J. G. Phelps, M.D.
1884 Stokes, James.

Date of Election.

1903 Strauss, Frederick.
1911 Streat, James.
1906 *Strong, Charles Hamot.*
1873 Sturges, Frederick.
1875 Sturges, Henry C.
1906 Sturges, Rush.
1873 *Sturgis, Frank K.*
1891 *Suckley, Robert B.*
1903 Sutton, James F.
1893 Swayne, Francis B.
1906 Sweet, Henry N.
1905 Swords, Henry C.
1913 Taft, Henry W.
1882 *Tailer, Edward N.*
1906 *Talbot, Fritz B., M.D.*
1877 *Talcott, James.*
1889 Tatham, Charles.
1912 Tator, Charles Samuel.
1902 Taylor, Charles H., Jr.
1906 Taylor, Ellsworth M.
1906 Taylor, Frank B.
1895 Taylor, George.
1903 Taylor, Henry R.
1901 Taylor, Walter C.
1911 *Terry, John T., Jr.*
1876 *Terry, Rev. Roderick.*
1891 Thaw, Benjamin.
1913 Thaw, Stephen Dows.
1905 *Thebaud, Paul G.*
1905 *Thomas, William S., M.D.*
1904 *Thompson, Mrs. Frederick F.*
1901 *Thompson, Lewis S.*
1911 *Thompson, Robert M.*
1898 Thompson, Walter.
1902 *Thomson, Elihu.*
1886 Thorne, Jonathan.
1890 Thorne, Samuel.
1911 Thorne, Samuel, Jr.
1891 *Tobey, Gerard C.*
1911 Tobey, Orville H.
1906 Townsend, Edwin S.
1911 *Tuck, Edward.*
1899 *Tucker, George F.*
1901 *Tuckerman, Alfred.*
1901 Tuckerman, Paul.
1900 Turnure, George E.
1909 Tweed, Charles H.
1911 *Udall, John Clark.*
1905 Ulich, H. P.
1891 Ullmann, Emanuel S.
1891 Ulmann, Ludwig.

Date of Election.

1897 *Underhill, Eugene.*
1913 Untermeyer, Charles S.
1910 Vail, Theodore N.
1906 *Vaile, Joel F.*
1887 *Van Alen, J. J.*
1897 Van Antwerp, William C.
1889 *Vanderbilt, George W.*
1878 *Vanderbilt, William K.*
1906 Van Dusen, Major James Wallace.
1910 *Van Gerbig, Barend.*
1902 *Van Rensselaer, A.*
1905 Van Sinderen, Howard.
1887 *Van Slyck, George W.*
1891 *Van Winkle, Edgar B.*
1913 Varney, Burton Merrill.
1906 Veeder, Curtis H.
1903 Veit, Richard C.
1900 *Vetter, Dr. Charles.*
1909 Viquez, Cleto Gonzales.
1901 von Briesen, Arthur.
1875 *von Post, Herman C.*
1903 von Schmid, J. O.
1913 von Zedlitz, Mrs. Anna M.
1890 *Wadsworth, Herbert.*
1898 *Wadsworth, Wm. Austin.*
1898 Wait, William B.
1908 Walker, Amasa.
1900 Walker, Henry Freeman, M.D.
1898 Warburg, Felix M.
1911 *Warburg, Paul M.*
1905 Ward, John Gilbert.
1895 Warren, William R.
1889 *Waterbury, John I.*
1911 *Waterman, Frank D.*
1898 *Watkinson, George.*
1884 *Watson, George H.*
1876 Wedemeyer, A. J. D.
1911 *Weekes, F. Delano.*
1900 *Wehrhane, Charles.*
1895 Wells, Charles W.
1905 *Wells, Mrs. John.*
1910 Wemyss, Miss Henrietta C.
1898 Weston, Edward, Sc.D., LL.D.
1906 Weston, Frederick W.
1888 Wetmore, Edmund.
1874 *Wetmore, George P.*
1901 *Wetmore, W. S. K.*
1872 *Wetmore, William Boerum.*
1905 Wheeler, John Davenport.
1906 Wheeler, Samuel H.
1905 Whitaker, John E.

Date of Election.

1887 White, Alfred T.
1887 *White, Henry.*
1887 *White, J. LeRoy.*
1887 White, William Augustus.
1905 White, William H.
1901 Whitehouse, William FitzHugh.
1891 Whitney, Milton B.
1902 *Whitney, W. Beaumont.*
1908 Wickersham, George W.
1912 Willard, Daniel E.
1913 Willets, Elmore A.
1901 *Willets, Howard.*
1882 *Williams, David.*
1912 Williams, John H.
1902 *Williams, John Skelton.*
1911 Williams, Dr. M. B.
1906 *Williams, Richard H.*
1901 *Williams, Timothy S.*
1911 Williams, William.
1893 Wills, Charles T.
1913 Willson, Frederick N., C.E.
1913 Wilson, J. Howard, Ph.D.
1870 *Wilson, Gen. James Grant.*
1909 Wilson, M. Orme.
1911 Wilson, Theodore Dehon.
1875 Winslow, Gen. Edward F.
1901 Winslow, John Flack.
1902 Winter, Emil.
1900 *Winthrop, Grenville L.*
1913 Winton, Will McClain.
1888 Witherbee, Frank S.
1891 Wolcott, Henry Roger.
1897 Wolff, Emil.
1909 Wolff, M. A.
1911 *Wood, Edwin O.*
1905 Wood, Henry A. Wise.
1903 Wood, Henry R.
1911 Wood, William C.
1912 Woodman, J. Edmund.
1913 Worrall, Richard P.
1904 Wright, J. Dunbar.
1886 Wright, William Phillips.
1907 Wunderlich, Frederick W., M.D.
1902 *Wyckoff, Clarence F.*
1902 *Wyckoff, Edward G.*
1901 Wyckoff, William F.
1905 Yeisley, George C., D.D.
1913 Young, Charles H., M.D.
1911 Yulee, C. Wickliffe.
1884 *Zabriskie, Andrew C.*
1898 Zaring, Charles W.

GEOGRAPHICAL RECORD

NORTH AMERICA

A New Snowfall Chart of the United States. Mean annual snowfall maps of the United States were prepared by Professor M. W. Harrington (1896), based on data from 1884 to 1891, and by Professor A. J. Henry (*Monthly Weather Review*, March, 1898), based on observations taken in 1884-1895. A new snowfall chart, by Charles F. Brooks (prepared in the course in Climatological Research, given in Harvard University) is published in the *Quarterly Journal of the Royal Meteorological Society* for April, 1913 ("The Snowfall of the United States"). This is now the latest, as well as the most accurate, chart which is available.

The author has collected the data from more than 2,000 stations for the fifteen years, 1895-1910, and from these results he has prepared a map showing the annual depths of snowfall over the United States. The effects of topography, prevailing winds, storm frequency, and the location of the Great Lakes and oceans are very apparent. The western coast ranges (Sierra Nevada-Cascades) lying in the path of the prevailing westerlies blowing from the Pacific Ocean, have excessive snowfall (in many places exceeding 400 inches a year) on their western flanks. The dry interior basin to leeward of these mountains has very little snowfall except where mountains rise above the general level. The Rocky Mountain chain again brings copious snowfall, exceeding 100 inches a year in a great many places from Idaho and Montana south to northern New Mexico; and in some places in Colorado as high as 400 inches a year, and 300 inches a year in southern Wyoming. Again, in the lee of these mountains, the dry western Plains have deficient snowfall. On nearing the Great Lakes the snowfall increases, and on the southeast shores of each of the Lakes 80 to 100 inches of snow fall annually. The Appalachian Mountains bring the lines of equal snowfall far south, there being 50 to 100 inches in the mountains from Maryland to Maine. In northern New England frequent storms in winter cause a snowfall of more than 100 inches annually. In the southeastern United States snowfall occurs practically everywhere, except in extreme southern and eastern Florida and southern Texas. The Gulf Stream shows its influence as far as Cape Hatteras by bending the lines of equal snowfall far to the north. R. DEC. WARD.

A Geological Publication for Students. Among recent publications of educational interest produced by state surveys is *Bulletin 14* in the fourth series of the State Geological Survey of Ohio, entitled "The Geology of the Columbus Quadrangle." The areal geology is described by Dr. C. R. Stauffer, the physiographic geology by Dr. George D. Hubbard and the economic geology by Dr. J. A. Bownocker. The *Bulletin* was prepared primarily for the information of students who are familiar with the neighborhood of Columbus. The treatment is therefore untechnical and explanatory, with especial emphasis on areal and physiographic geology. Dr. Hubbard, in four chapters, treats of the present topography, pre-Wisconsin events, the Wisconsin ice and its work and postglacial history. Soils, underground waters, clays and building stones are discussed in the part given to economic geology. Twenty-eight well-chosen plates illustrate the text. F. V. EMERSON.

In Memory of Professor Tarr. A memoir of the late Professor Ralph Stockman Tarr of Cornell University, for many years Associate Editor of the *Bulletin* of this Society, has been published by J. B. Woodworth (*Bull. Geol. Soc. Amer.*, Vol. 24, 1913, pp. 29–43).

A memorial window in honor of Professor Tarr was dedicated at Sage Chapel, Cornell University, on March 23. It was accepted for the University by Acting President T. F. Crane. In the course of a most effective address by Professor Lawrence Martin, he said:

"This memorial window, dedicated to Professor Tarr, is given by Mrs. Tarr to Cornell University. Thus the present and future generations of Cornell students and of worshippers in this chapel will be reminded of one who was a faithful and inspiring teacher and a great scientist."

Professor Martin vividly described Professor Tarr's remarkable career from the years when he worked his way through college to his early death at the age of 48, giving all his life to the hardest of toil and service. As a professor at Cornell he spared no pains to make his lectures and his laboratory and field work clear, interesting, disciplinary and scientifically sound. All of the students under his care gained with their knowledge of geology and physical geography a sense of admiration and affection for the teacher. He imparted his knowledge of the facts of geography to hundreds of thousands of readers of his books; and his books were written with the utmost regard for truth and for the upbuilding of character. Professor Martin told how various features of the landscape depicted on the window were symbolical of Professor Tarr's life.

All American geographers will be glad to know that this beautiful memorial of one of the most distinguished of their fellow members has been placed in the University where the greater part of his fruitful professional life was spent.

The North River. A correspondent asks if the Hudson River does not extend to Upper New York Bay and, in that case, why the name North River is applied to the lower part of the Hudson. The Hudson River, of course, extends from its sources to New York Bay. When Henry Hudson rediscovered the river and ascended it in 1609 to where Albany now stands his sailors called it the Noord (North) River. Soon after, Dutch immigrants settled on Manhattan Island and naturally used the name North River to designate the river west of them. The English in 1664 gave to the river its modern name in honor of Hudson, but the inhabitants of Manhattan had become so accustomed to the old name as applied to the stretch west of their island home, that it has persisted in common usage to this day; it is not, however, often applied to the Hudson River to the north of Weehawken, N. J., or West Forty-Second Street, New York. We may say that the name North River is merely a local designation of the extreme southern part of the Hudson extending only a few miles above the mouth of the river. Giovanni da Verrazzano went a short distance up the Hudson in 1524, but it was Hudson who demonstrated its extent and importance.

Mr. G. C. Curtis's Naturalistic Model of the Kilauea Crater, Hawaii. A letter from Mr. Curtis to the Society under date of June 22 informs us that he has completed the collection of data for a naturalistic model of this crater. The expression "naturalistic land model" is now applied to a scientific representation of the real forms, appearance and character of a land area. This implies that the model must reproduce, according to the scale of the work, not only the natural furms of the land but also represent its coloring and natural appearance. The *Bulletin* (May, 1913, p. 366–367) reported that the Geological Museum of Harvard University was sending Mr. Curtis to Hawaii to collect data for such a model of Kilauea Volcano. Mr. Curtis writes that, as far as he is aware, he has collected the most complete data ever gathered on a subject of this nature. He spent 75 days in the field and made a thorough physiographic survey. The model should be an important addition to the already unique collection of naturalistic land relief models now at Harvard. Mr. Curtis is returning home via Japan and the Suez Canal.

The Growing Gold Product of the Klondike. The value of the gold produced in the Klondike region of the Yukon Territory last year was $5,225,235. This was the largest output since 1907, when it reached the lowest point. Since that time there has been a steady increase as shown by the following figures: 1907, $2,983,835; 1908, $3,288,664; 1909, $3,595,985; 1910, $4,081,611; 1911, $4,024,246; and 1912, $5,225,235. The prospects for the present year bid fair to reach the $6,000,000 mark.

Widening the Meteorological Service of Canada. The Canadian Meteorological Service is increasing the efficiency of its daily weather map by using cabled reports from Ireland, the Farœ Islands, London, Stornaway, Malin Head, Blacksod Bay, Shetland Is., Cuxhaven, Vladivostok, Shanghai, Lisbon, Azores,

Turks Island, Havana, Honolulu, and Manila, together with several U. S. stations in Alaska, twelve in Russia and Siberia, and one in Japan. These reports are received in Toronto about 10 A. M. and together with the reports from Washington and Mexico are entered on a map on the polar projection and show with fair certainty the distribution of pressure over the northern hemisphere. (*Jour. Astronom. Soc. of Canada*, March–April, 1912, pp. 75–87, Toronto.)

Copper in the Coppermine Country. Mr. J. B. Tyrrell, the well-known Canadian explorer, has published a paper, "The Coppermine Country," in which he has collected all the evidence with regard to the existence of copper in the basin of the Coppermine Region. Summing up the evidence, he regards it as certain that a great copper-bearing area exists on the Arctic coast of America near the Coppermine River. He adds: "It is also reasonably certain that that area is very much more extensive than the copper-bearing area south of Lake Superior, extending, as it does, from Victoria Land and the hills west of the Coppermine River to the shores of Bathurst Inlet far to the east; but whether native copper will be found anywhere as plentifully distributed or in such rich segregations as on Keweenaw Point, is yet quite uncertain. As the copper-bearing area in Northern Canada is larger it is quite possible that the mineral deposits may be similarly larger, and it is worth while for the Canadian people to find out whether they have in this far northern country a great reserve of copper ore for the use of themselves and the world when the mines that are now being worked shall become depleted." Mr. Tyrrell exhibited specimens of native copper that had been brought by Eskimos from the Coppermine River.

CENTRAL AMERICA AND WEST INDIES

West Indian Hurricanes. On the basis of the observations of hurricanes in the West Indies during the past thirty-five years, Professor Oliver L. Fassig, of the U. S. Weather Bureau, has brought out some new facts ("Hurricanes of the West Indies," 1912). The "hurricane belt" extends from longitude 56° W. to 90° W. and from latitude 12° to 26° north. Roughly, the area embraces the Caribbean Sea, the Gulf of Mexico and the West Indies. The geographical center of origin for the entire hurricane season is in latitude 20° north and longitude 73° west, or just off the northwest coast of Haiti. The recurvature takes place, on the average, in latitude 28° north and longitude 82° west, or in the center of the Florida peninsula. The path of a hurricane depends largely upon its point of origin. While a hurricane may originate in any part of the normal track, it will approximately follow, for the rest of its existence, the normal path for the month in which it occurs. In August and September the points of origin are farthest to the east, and in June and July they are farthest west. The latitude of the place of origin varies only between latitudes 20° and 22° north, while the latitude of the point of recurvature varies from 25° north in October to 30° north in August. There appears to be a considerable variation in the latitude and longitude of the annual paths, and it is the author's opinion that "further investigation of this point will probably reveal a close relationship between the paths of these storms and the distribution of pressure over the North Atlantic."

Of all hurricanes recorded during the past 35 years, 88 per cent. came in August–October, leaving only 12 per cent. for the rest of the season. The "active season" is really only about ten weeks, and the average frequency for the entire season is four storms, averaging about one in each of the months from August to October, and one in the remainder of the season. The average hourly velocity is 12.5 miles, and the new figures are not in accord with the general impression that hurricanes move more slowly while recurving than on the first branch of their track. A further noteworthy fact is that the September and October storms show a rapid increase in velocity on the second branch as compared with the first (18 as against 10 miles an hour), while the May–August storms show little or no increase. This is doubtless due to the greater velocity of the general circulation in autumn.

The hurricane of August 7–20, 1899, is made the subject of a special account. At Arroyo the barometer read 27.75 inches at its lowest (8 A.M.), with the wind from the north. The calm lasted about 15 minutes. Then the wind changed and blew with terrific force from the south. R. DEC. WARD.

SOUTH AMERICA.

The Instituto Historico e Geographico de Sergipe. This Society was founded at Aracajú on August 6, 1912. Its object is to foster historical and geographical studies relating to Brazil and particularly to the State of Sergipe. The first number of its quarterly publication came from the press this year. It contains an account of the proceedings of the founding together with notes on Sergipe. A list of the members and the minutes of the meetings held before the date of publication are also given.

AFRICA.

Railroads in Tripoli. Fifty miles of track, all built since the Italian occupation, are now operated by the government, according to the *Rivista Coloniale* (April 15, 1913, pp. 275–276). Starting from Tripoli the lines radiate to Sensur on the west, Azizieh and Ain Zara on the south and Tajurah on the east. This system will be the nucleus of the future network in the colony. As far as can be ascertained at present, the line extending to Azizieh will be prolonged to Ghurian. Thence it will fork in two branches, one headed in a westerly direction to attain Ghadames, the other towards the south with Murzuk as its objective point. Surveys are about to be undertaken for the extension of the Tripoli-Sensur branch to Suara as well as for a line to connect Tripoli with Misrata via Homs.

In the eastern section of the colony it is proposed to connect the seaport of Bengazi with Derna by a line skirting the coast. Bengazi will also be the terminus of a rail route to the Aujila and Jallo oases in the Libyan desert.

Origin of Storms in Mountainous Regions of French Western Africa. Results of observations mainly in French Guinea are given in *La Géographie* (Vol. 27, No. 3, March 15, 1913, pp. 208–210) by Mr. Schwartz in charge of the Liberia-Guinea-Ivory Coast mission. His conclusions are (1) that in each mountainous region there exist points which may be termed centers of storm formations; (2) that these points generally constitute enclosed valleys or else valley heads surmounted by ranges 400 or 500 meters high; (3) that the mechanical process of formation may be described as follows: Intense evaporation and constant rush of air occur at each center of formation on account of the higher temperature caused by the radiation of the soil. These phenomena determine cloud nuclei and engender a slight gyratory motion which helps to attract the surrounding clouds in a given radius. Under solar action the gyratory motion is intensified and persists until all the neighboring clouds are gathered together. The rising waterspout drifts in a general westerly direction towards the zone of the prevailing wind (harmattan). Its course is largely determined by topographical accidents. As a rule it follows the trend of the valleys.

These storms burst at about 50 minute intervals every day. Their start appeared to be related to lunar motion, so that the following schedule was tentatively determined: in the first quarter the storm begins about 2 P.M.; during full moon it breaks about 5 P.M.; in the last quarter the time shifts to 8 P.M.; during new moon, the storms occur at midnight. This sequence is subject to further verification before being considered as final.

ASIA.

Mountaineers at High Altitudes. Filippo de Filippi in his book "Karakoram and Western Himalaya 1909" (pp. 363–364), says: "At the end of our campaign seven Europeans spent nine days at a height of more than 20,700 feet, during which time four of them camped for the night at 21,673 and 22,483 feet, and this without even the inconvenience of sleeplessness. They likewise made two steep ascents, through deep soft snow, to 23,458 and 24,600 feet, without exhaustion, without lowering of *morale*, without exaggerated difficulty of breathing, palpitation or irregularity of the pulse; and with no symptoms of headache, nausea, or the like. The fact of their immunity admits of but one interpretation —rarefaction of the air, under ordinary conditions of the high mountains, to the limits reached by man at the present day ($12\frac{8}{12}$ inches) does not produce mountain sickness. Moreover, rarefaction of the air is not incompatible with mountaineering work, if this is done very slowly and methodically. From this

it follows that the phenomena which have to this day been considered to be the result of rarefaction are, in reality, phenomena of fatigue, or merely incapacity (temporary or permanent) of the system to sustain the exertion of climbing, manifesting itself with special symptoms under the presence of the particular external conditions which prevail in the mountains.

"None the less, the experience of the expedition was not one of absolute immunity. The atmosphere of those heights did work some evil effect, revealing itself only gradually, after several weeks of life above 17,000 feet, in a slow decrease of appetite and consequent lack of nourishment, without, however, any disturbance of the digestive functions. It was possible for the lack of appetite to become almost absolutely repugnant to food, if after its appearance one moved and established himself at a greater height. Thus, at Chogolisa Camp the Duke and the guides had given up meat and lived on soups, coffee, tea, chocolate, and biscuits. In the two ascents above 23,000 feet their only food all day was a little chocolate, although they suffered no nausea or other unpleasant sensations. Of course, in the long run, this insufficient nourishment would cause a lowering of vitality, loss of flesh and a certain amount of anæmia. However, the process is so slow that we were still at the end of two months in condition to make long marches without experiencing excessive fatigue."

EUROPE

A Notable Example of Stream Piracy in Europe. Geographical considerations had led many geographers to assume that the Moselle River drained into the Meurthe. The topography of the drainage basin is mainly characterized by the gradual decrease of alluvial hills in the neighborhood of Toul and by the widening of the Val de l'Ane. The assumption has lately been corroborated by geological evidence supplied by Mr. R. Nicklès.[1] P. Lemoine, in *La Géographie* (Vol. 27, No. 3, March 15, 1913, pp. 211–212), calls attention to the fact that geography had permitted correct interpretation of facts in advance of geological proof.

The stratigraphical sequence afforded by a section in the vicinity of the Longor mill revealed how the ancient course of the Moselle was directed towards the Meuse. The succession consisted from top to bottom of calcareous waste in place, clayey sands 1 to 2 meters thick, and white arenaceous layers which were found to be very friable and in which the presence of mica denoted granitic and hence Mosellian genesis. The basal element was constituted by a coherent conglomerate composed of coarse siliceous sands in which boulders of Devonian quartzite, white quartz and granite abounded. The reconstitution of former events being therefore perfectly feasible, it was safe to surmise that the conglomerates represented a period of rapid currents, that is to say, one during which communication existed in its normal stage. The friable sands indicated a slackening in the speed of flow and the beginning of the diversion into the Meurthe. Finally, the clayey sands denoted a period of stagnation characterized by swamps and completed change of the course of drainage.

POLAR

Antarctic

Dr. Mawson's Expedition. The Sydney *Daily Telegraph* of March 24 reported the arrival in Sydney of eight members of the Mawson Expedition, including Mr. Frank Wild, who led the western party that wintered in the neighborhood of Wilkes's Termination Land. The paper also printed an appreciation by Professor David of the work thus far done by the Mawson Expedition. He says that from the charts brought back by Capt. Davis of the *Aurora* it is obvious that the prolonged work of the various branches of the expedition ashore and afloat have led to the accurate delineation of about 1,000 miles of coast line while at intervals geological specimens have been obtained from rocky islets and promontories emerging from the ice. The actual presence of rock foundations was determined in the neighborhood of nearly the whole coast explored so that

[1] Contribution à la connaissance de la jonction ancienne de la Moselle et de la Meuse par le Val de l'Ane. *Bull. Séances Soc. Sciences de Nancy, 1912.*

previous errors as to the position of the coast line due to the mistaking for it of pack ice edges or lines of icebergs have been avoided.

Mr. Wild has given to Reuter an account of his work. His party included G. H. Dovers, surveyor; C. Harrison, artist and biologist; A. C. Hoagley, geologist; B. E. Jones, surgeon; A. L. Kennedy, magnetician; J. H. Hoyes, meteorologist; and A. D. Watson, geologist. It left Mawson in Adélie Land on Jan. 19, 1912, to form a second base on Sabrina Land or Knox Land. It was found that Sabrina Land did not exist and ice prevented access to Knox Land. Steaming further east they sighted, on Feb. 11, a glacier which Wilkes perhaps had mistaken for Termination Land. They landed there on Feb. 15 and named it Shackleton Glacier. Its cliffs, 100 feet high, were badly broken and crevassed. The hut and stores were hoisted up this cliff and moved 640 yards from the broken edge. The winter hut was erected there. Then they prepared for sledging but were detained till the middle of March by blizzards and snow-drifts, fifteen feet deep.

When the weather permitted, six men left the hut to lay out a depot on land which was seen 17 miles to the south. After 8 days' traveling the party attained a point thirty-five miles inland on the continent and 2,200 feet above the sea.

Two sledge parties of three men each were sent out in August, one going east and the other west. The latter surveyed all the coast line to the point reached by the German Expedition of 1902. The western party did most of its traveling on land at an altitude of 2,000 to 3,000 feet. On one trip it made 510 miles at that altitude. The eastern party surveyed as far as 101° E. long. and went inland for 50 miles, reaching an altitude of 4,500 feet. Wild named this part of the Antarctic Continent Queen Mary's Land. It has a coast line of 350 miles and ascends probably to the Pole itself.

Another Antarctic Expedition Going to Weddell Sea. The *Bulletin* announced (August, p. 619) that the Filchner Expedition would not return to Weddell Sea to complete its proposed work. The task will be taken up by an Austrian expedition under the leadership of Dr. Felix König. It will start for Weddell Sea in May next year. The organizing committee has purchased the *Deutschland* of the Filchner expedition. It expects to study the relations between South America and the Antarctic continent, to add to the meteorological and hydrographical results obtained by Filchner, to survey the unknown stretch of coast between Coatsland and Prince Regent Luitpold Land, and to make sledge journeys to determine the extent of the ice barrier, the relations between West Antarctica and the Queen Maud Mountains of Amundsen, and the inland ice and its elevations. Dr. König is an expert Alpinist, has seen Arctic service in Greenland and had Antarctic experience with the German Antarctic expedition.

Latest Voyage of the Antarctic Ship "Deutschland." The *Bulletin* for April (p. 430) announced that the *Deutschland* after the return of the German Antarctic Expedition undertook a new voyage to South Georgia to bring away the Argentine observers. The *Geographical Journal* (July, 1913, p. 83) reports that some valuable soundings and other observations are said to have been carried out during the voyage. The position of the South Orkneys was found to need rectification on the charts, which also fail to show a series of reefs dangerous to navigation. The soundings, combined with earlier ones taken by the *Deutschland*, show that the Sandwich Island ridge is continued below sea-level towards the Orkneys, but that there is no connection with the sill of the Falklands. The reported "Dinklage Bank" (between 45° and 49° S., 27° and 35° W.) does not exist, and it seems probable that the Weddell Sea is joined to the Argentine basin by depths of over 5,000 meters (2,730 fathoms).

ECONOMIC AND COMMERCIAL GEOGRAPHY

The German-South American-West African Cable. Germany now has 26,998 miles of ocean cable. The latest of these cable enterprises binds Germany with several points of the west coast of Africa and with South America. On August 26, 1909, a cable of the German South American Telegraph Company was completed from the German port of Emden to Santa Cruz on the island of Teneriffe. On March 21, 1910, the extension from Teneriffe to Monrovia, Liberia, went into operation; on March 29, 1911, the cable was opened between Monrovia

and Pernambuco, Brazil; and on Jan. 20, 1913, the cable was installed from Monrovia to Lome (Togo) and Duala (Kamerun). The *Deutsche Kolonialzeitung* (Vol. 30, 1913, No. 22, pp. 378–379) describes the development of this German connection with West Africa and South America with illustrations showing the installation of the service at Monrovia and Lome.

PERSONAL

Dr. L. A. Bauer has been elected Corresponding Member of the Portuguese Academy of Sciences.

Mr. Avard L. Bishop of the Sheffield Scientific School, Yale University, is writing papers in the field of economic geography. He spent some time in Canadian travel during the recess.

Dr. J. B. Charcot, the French Antarctic explorer, has been elected an honorary member of the Berlin Geographical Society.

Dr. P. E. Goddard of the American Museum of Natural History was preparing in July for a trip to the upper Peace River country of northwestern Canada to study the Beaver Indians.

Dr. G. W. Goethals, Chief Engineer of the Panama Canal, has received the degree of Doctor of Laws from the University of Pennsylvania.

Dr. J. Scott Keltie has been elected an honorary member of the Berlin Geographical Society.

Dr. Otto Klotz, Astronomer, Ottawa, Canada, has received the honorary degree of Doctor of Science from the University of Michigan.

Dr. Alfred C. Lane, Professor of Geology and Mineralogy in Tufts College, has received the degree of Doctor of Science from that institution.

Dr. Ludwig Mecking, of Göttingen University, has been appointed Associate Professor of Geography at the University of Kiel.

Duke Adolf Friederich of Mecklenburg and Professor Hans Meyer have each received the Nachtigal medal of the Berlin Geographical Society for explorations in Africa.

Mr. John Muir has received an honorary degree from the University of California.

Mr. A. G. Ogilvie has been appointed Junior Demonstrator in general geography and Mr. S. Thompson Lecturer in ancient geography at Oxford University.

Rear-Admiral Robert E. Peary received the decoration of the Legion of Honor when he lectured before the French Geographical Society on the evening of June 6. Tufts College has given him the degree of Doctor of Science.

Prof. Dr. A. Penck of the University of Berlin has been appointed Corresponding Member of the Section of Geography and Navigation, Academy of Mathematical Science, Paris.

Dr. J. Wilhelm G. Schulz has been appointed Chief of the Geodetic Section of the Military-Geographical Institute of Argentina.

Professor J. Russell Smith, Wharton School of Finance, University of Pennsylvania, has been engaged since March in the study of erosion as it affects agriculture and of trees as crop yielders with special reference to their more extended use in agriculture. He has been carrying on this work in Portugal, Spain, Algeria, Tunis, Italy, France and the southern part of the United States.

Dr. Herbert J. Spinden spent the summer in New Mexico in ethnological work among the Pueblo Indians of the Rio Grande Valley for the American Museum of Natural History.

Dr. Aurel Stein of Oxford has been elected honorary member of the Berlin Geographical Society.

Mr. Leonhard Stejneger, Naturalist of the U. S. National Museum, Washington, returned in June from the Eastern Alps, where he made comparative studies of the "Life Zones" in Europe and America.

Commandant Jean Tilho, known for his scientific work in the Lake Chad Region, has been elected an honorary member of the Berlin Geographical Society.

Dr. Otto H. Tittmann, Chief of the Coast and Geodetic Survey, has been elected honorary member of the Berlin Geographical Society.

Mr. W. P. Wilson, Director of the Commercial Museum, Philadelphia, spent nearly two months in Yucatan and Campeche last winter making studies of the growth of the henequin and timber industries in both states.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

AFRICA

Africa. Selected by F. D. Herbertson, Edited by A. J. Herbertson. 2nd edition. Series: Descriptive Geographies from Original Sources. xl and 264 pp. Ills., index. A. & C. Black, London, 1907. The Macmillan Co., New York, 1907. 70 cents. 7 x 4½.

The physiographic elements, plants, animals, and people are described for each division of Africa. These descriptions, each written by men who have actually been on the ground and seen for themselves that of which they write, make the reading and study of this book of exceptional interest and value. The references to the original sources from which each description has been taken, together with the rather full bibliography appended give the teacher and student an excellent opportunity for systematic supplementary reading. And not only is the reading matter of value, but the numerous illustrations add vividness to the printed text. WILBUR GREELEY BURROUGHS.

Durch Sand, Sumpf und Wald. Missionsreisen in Zentral-Afrika. Von Franz Xaver Geyer. xii and 555 pp. Maps, ills. G. J. Manz, München, 1912. 10½ x 7½.

The author makes no profession of exploring the wilder parts of his diocese, which extends from Khartum to the lakes. But in the course of his episcopal duty he had to penetrate the wilds in visitations to mission stations already planted and to choose the sites for new endeavor of this sort. He was forever exploring Africa in the most practical way, and this work is truly an explorer's record. Of course, he wrote the book with no other aim than to interest those of his communion at home who had made possible his work of evangelization. It amounts to no more than a diary of a bishop on his travels. Because of its simplicity in aim the work has great value. It is an unassuming day book. At each night's camp the bishop set down the things which during the day's march had attracted his interest. The result is a very intimate record. It abounds in the sort of thing which many explorers are prone to omit from their record. It fills in many details of topography and is rich in ethnological statements of great value. If the lack of an index is ever to be forgiven it may almost be done in this instance, for the book is so full of cuts that it is generally possible to use them for the purpose of running down a reference.

WILLIAM CHURCHILL.

ASIA

Bismya, or the Lost City of Adab. A Story of Adventure, of Exploration, and of Excavation among the Ruins of the Oldest of the Buried Cities of Babylonia. By Edgar James Banks. xxii and 455 pp. Map, Ills., index. G. P. Putnam's Sons, New York, 1912. 9 x 6.

The story of American excavation in Babylonia continues to combine in an unusual degree scientific research and happy adventure in a strange land. Following upon the preliminary survey of the mounds by Dr. Wm. Hayes Ward in 1884–1885, and the expedition of the University of Pennsylvania to Nippur in 1889–1896, is the work of the University of Chicago at Bismya in 1904, of which

this book is the official record. Dr. Edgar J. Banks, who had already spent three years at Constantinople seeking an *iradé* to excavate at Bismya, was made Field Director, and to his unwearied efforts the success of the undertaking is due.

Bismya, the ancient Adab, is one of the oldest ruins of Central Babylonia, but, unlike Nippur, has not been built upon by successive waves of Persian and Parthian civilization. It consists of twelve mounds intersected by an ancient canal bed and originally surrounded by a double wall and ditch. Of value to the archæologist is the discovery of a small cemetery with brick tombs containing vases, seal cylinders and jewelry; of what seems to have been a crematory; of numerous heads and fragments of statues in the round, together with the almost perfect statue of a king reigning in Adab possibly as early as 3000 B. C. The temple yielded burnt clay lamps and vases, fragments of stone vases with archaic designs inscribed or inlaid with ivory and lapis lazuli, objects of carved alabaster and ivory, and a few copper implements found in the lower strata. Of peculiar interest is the Semitic quarter where the heads found were Semitic, not Sumerian in type, and the tablets were in Semitic Babylonian.

How great may be the antiquity of the lower strata of the mound can hardly be determined. The top bricks of the temple, 43 feet above the level of the desert, bear the name of Dungi (2350–2400 B. C.). Next are Ur-Engur's, and below are the levels of Naram-Sin and Sargon (2600–2650 B. C.). Still below are strata of long grooved bricks resting upon plano-convex bricks, unstamped but inscribed with distinctive marks. Beneath this level the nature of the strata and of the building materials changed abruptly, and throughout the remaining 30 feet to virgin soil suggests a period antedating Sumerian occupation.

No less interesting than the archæological data is the record of camp life with its constant danger from hostile tribes, of the customs of the desert, of pilgrimages to other mounds and sacred places, and of the wanderings along the Tigris and the Euphrates to the traditional site of the Garden of Eden. Throughout it all the author writes with keen observation and an easy *naïveté* which takes the reader into his confidence and makes him perceive with the eyes and ears of the Orient itself.

ELLEN SETON OGDEN.

Northern China. The Valley of the Blue River. Korea. Madrolle's Guide Books. xxvii and 471 pp. Maps, plans, index. Hachette & Co., Paris and London, 1912. 15s. 7 x 5.

This follows closely the Baedeker method, for experience has shown that to be the best type of guide book literature. But the difference in life and custom has introduced an essential modification. In almost every page the necessary information as to accommodations and cost and route of wheelbarrow journeys to the next halting spot is interspersed with comment upon objects of interest so that the traveler need not pass along the interesting way debarred from knowledge. These inserts have been intelligently chosen by the editor from the works of the best authorities. The always perplexing question of transliteration undergoes a particular complication in the volume. In the text a general attempt has been made to conform to the common English transliteration of names, but in the maps and city plans with which the text is filled the transliteration is uniformly French.

WILLIAM CHURCHILL.

An Outline History of China. Part I: From the Earliest Times to the Manchu Conquest, A. D. 1644. By Herbert H. Gowen. 208 pp. Index. Sherman, French & Co., Boston, 1913. $1.20. 8 x 5½.

Since the title page indicates that this is but the former moiety of a history which shall apparently cover the Chinese Empire down to the downfall of the empire, the fall of the Ming dynasty in the middle of the seventeenth century forms a convenient point of separation between the old and the new. The author decries other histories of China as lacking in information as to the antecedent four millenniums, which are covered in this volume. The difficulty lies in the Chinese annals which must be the sole reliance for this long stretch of national life. To learned Chinese they are stored with the details of history, the record of those things which have caused China to advance and to crystallize. But they lack the record of those things which make western history, wars and persecutions and all other such themes of personal inconvenience. Still, Professor Gowen has succeeded in piecing together a narrative of the past which is to serve as a compendium of early Chinese history.

WILLIAM CHURCHILL.

Our Neighbors: The Japanese. By Joseph King Goodrich. 253 pp. Ills., index. F. G. Browne & Co., Chicago, 1913. $1.25. 7 x 4½.

A very readable description of Japanese, Formosan and Korean life is contained in this addition to the evergrowing literature concerning these peoples. The style is easy throughout so that the layman follows the story willingly and with considerable interest. This book will make a very admirable adjunct to a supplementary reading library of the school classroom. It is well illustrated by 16 photographs and is supplemented by a fairly complete bibliography of recent literature. EUGENE VAN CLEEF.

AUSTRALASIA AND OCEANIA

Hawaii, Past and Present. By William R. Castle, Jr. xii and 242 pp. Map, ills., index. Dodd, Mead & Co., New York, 1913. $1.25, postage 12 cents. 7½ x 5½.

Designed to give comprehensive information about the islands, their history, scenery and present conditions. The author is not a tourist, but writes with the intimate knowledge of one reared in Hawaii and devoted to its interests.

The introductory chapter gives an outline of the chief geographical facts—the position, origin, climate and life of the islands, including man. An unqualified tribute is paid to the results of a hundred years of Americanization upon the spirit and life of the people. A chapter dealing more fully with the Hawaiian people is followed by two distinctively historical chapters—history to 1898, and Hawaii as a territory.

The account of commerce and industry attributes the agricultural prosperity in part to the fact that the climate does not limit physical toil to the dark-skinned races. Sugar, rice and pineapples are the main products, with sugar far in the lead. Sisal, rubber, tobacco, coffee and bananas are lesser products having future possibilities. Honolulu claims a full chapter of the work and is marked for a great destiny as a commercial center in the mid-Pacific. A chapter is given to each of the larger islands, and the volcanoes and island life receive specific attention. An appendix contains notes of hotels and other data useful in travel, so that this most attractive volume may serve also as a practical guide-book for the tourist A. P. BRIGHAM.

EUROPE

The Brenner Pass, Tirol from Kufstein to Riva. By Constance Leigh Clare. Illustrations by J. F. Clare. xvii and 310 pp. Map, index. J. & J. Bennett, Ltd., London, 1912(?). 6s. 9 x 6.

A book dealing with the lowest and most important pass of the eastern Alps. It is the outcome of twenty visits to Tirol, spread over as many years, and is full of history, description and travelers' chat. There are chapters on the principal places of the Brenner route, from Kufstein and Innsbruck in the north, to Bozen, Trent and Riva in the south. The volume is too detailed for the average reader, but would be a useful companion to the leisurely traveler and would offer pleasant and instructive reminders to wanderers already familiar with these parts of Tirol. A. P. BRIGHAM.

A Military Geography of the Balkan Peninsula. By Lionel W. Lyde and Lieut.-Col. A. F. Mockler-Ferryman. Series: Black's Military Geography. x and 203 pp. Maps, index. A. & C. Black, London, 1905. Macmillan Co., New York. $1.40. 7½ x 5.

An interesting account of the Balkan Peninsula from the military-geographical point of view. It is intended primarily for students who may be particularly interested in military affairs. The first chapter emphasizes the importance of knowing the geography of a region where fighting is to take place. A chapter is then devoted to each Balkan state. The latter part of the book reviews the campaigns from 1700 to 1897, and finally gives a summary of conditions and a forecast.

The close agreement of the geographical interpretation of the country in

the light of what should logically happen in military and political affairs with what has actually occurred within the past year is worth noting.

EUGENE VAN CLEEF.

POLAR

Deutsche Südpolar-Expedition, 1901-1903. Herausgegeben von Erich von Drygalski. II. Band: Geographie und Geologie. Pp. 619-662. Ills. Georg Reimer, Berlin, 1912.

This seventh part of Vol. II of the official report on the scientific results of the German Antarctic Expedition consists of an introduction by the leader of the expedition, Erich von Drygalski, containing a most sympathetic necrology of his companions, E. Philippi and A. Stehr (who died in 1910 and 1909 respectively), and of three reports: the first by Philippi on the rocks and terrigenous material found in icebergs and the inland ice, the second and third by R. Reinisch on the petrography of the Antarctic erratics and the rocks collected *in situ* by the expedition on the Atlantic islands, St. Helena, Ascension, São Vicente and São Miguel.

The most striking characteristic of these reports is the absolute lack of consideration for the researches done previously in the same field of work. It is hard to understand how it was possible to avoid mentioning the master work of A. F. Renard on volcanic islands in a report where simply additional material to our knowledge of the rocks of some Atlantic islands is treated. If this omission was intended, one would like to know why the previous researches were not worthy of mention, or of criticism.

The same remark holds good for the other report of Reinisch, no mention being made of the rocks dredged during the Antarctic cruise of the *Challenger* 12° west of the *Gauss* station, and practically in the same latitude. Anyone who is interested in the geology of the Antarctic ought to know the important conclusions which, long ago, were drawn by Sir John Murray from the study of these erratics, and it would not have been at all out of place to compare the *Gauss* rocks with those of the *Challenger*.

In the memoir of Philippi a very complete description is given of the conditions under which the rocks were embedded in the ice of icebergs, and his work is a most valuable glaciological contribution. One can easily understand why no mention is made of previous similar observations, his conclusions aiming mainly toward the geological knowledge of the unknown Antarctic coasts east of the *Gauss* station. However, here again (p. 627) one has the right to take exception to the fact that this "high land" mentioned as situated east of Posadowski Bay, though evidently Termination Land, discovered long ago by Wilkes, is not mentioned as such.

Finally, in the introduction, von Drygalski, praising highly the sounding tube used during the voyage of the *Gauss*, says (p. viii) that such tubes were used for the first time on that vessel. This statement is worse than wrong, because such tubes were used on the *Belgica* in 1898 and 1899 with splendid results (bringing, in the case of the last *Belgica* sounding, deep sea sediment 60 centimeters thick from a depth of 4,800 meters); and these tubes were described and recommended to von Drygalski before his departure for the Antarctic. It is unpleasant for this reviewer to make this criticism; but even if von Drygalski had forgotten in 1912 the suggestion made to him in 1900, he should not have ignored what was printed in the *Memoirs* of the Belgian Academy (Memoires couronnés . . . collection in 8vo, Vol. 61: Bruxelles, 1901), as well as the small drawing published in the *Geographical Journal* in 1899 (Vol. 14, p. 80).

HENRYK ARCTOWSKI.

The North Pole and Bradley Land. By Edwin Swift Balch. 91 pp. Chart, index. Campion & Co., Philadelphia, 1913. 10½ x 7.

The author of this book is well known among geographers as the leading American writer and authority on Antarctic topics. Mr. Balch's literary results are always based upon careful study of data and critical use of them. He has, of course, employed his usual method in writing this book; and he has reached the conclusion that Dr. Cook's claim to have attained the North Pole has not been disproved.

Before discussing the evidence in the case Mr. Balch brings together in a short chapter the names of distinguished travelers such as Marco Polo, Amerigo Vespucci and many others who were first doubted and afterwards vindicated.

Mr. Balch bases his argument in favor of the credibility of Cook's claim to have reached the Pole upon an analysis and comparison of three journeys: Peary in 1906, described in his book "Nearest the Pole"; Cook in 1908, described in the *New York Herald* in 1909 and in his book "My Attainment of the Pole" published in 1911; and Peary in 1909, described in his book "The North Pole" published in 1910. Mr. Balch's book will probably stand as the best setting forth of the matter in justification of Dr. Cook's contention that has been or will be written. It is well to have his argument and conclusions on record. All geographers are, of course, in hearty accord with Mr. Balch's faith that Arctic exploration will not cease till all its secrets are revealed.

Croisière Océanographique Accomplie à Bord de la Belgica dans la Mer du Grönland, 1905. Relation Succincte du Voyage. Par A. de Gerlache. 70 pp. Maps, ills. 1909.

Campagne Arctique de 1907. (1) Étude Lithologique de Fonds Recueillis dans les Parages de la Nouvelle-Zemble. Par J. Thoulet. 28 pp. Maps, ills. (2) Microplankton des Mers de Barents et de Kara. Accompanied by plates in separate case. Par le Dr. Alph. Meunier. xviii and 355 pp. (3) Journal de Bord et Physique du Globe. 99 pp. Maps, ills. Imprimerie Scientifique, C. Bulens, Éditeur, Brussels, 1910-11. 14 x 11 each.

The scientific results which challenge attention in the narrative of this cruise are the remarkable set of soundings taken by the author's party. The explorers owed much of their success to the exceptionally favorable ice conditions prevailing north of lat. 76° in the summer of 1905. Deep sea observations were made while proceeding from north to south. Evidence of a suboceanic zone of relief in lat. 78° 10′ N. and between 5° and 17° W. can be inferred from the figures reported by Commandant de Gerlache. The relative shallowness of the western portion of this area appears to be particularly well marked. Here the length of line unwound did not exceed 58 meters in one instance and attained a maximum of only 490 meters for a degree and a half east and west of meridian 15° W. This submerged eminence[1] was called the Belgica Bank. Its morainic character was determined by the nature of the lithological specimens brought up.

The exploration of the east coast of Greenland between lat. 77° and 79°, while superseded by Erichsen's mapping, deserves notice as valuable pioneer work for its day.

Biological investigations made in the Kara and Barents Seas during the 1907 cruise of the Belgica were incorporated in a monograph by Mr. Meunier. This scientist has restricted the use of the term microplankton throughout his report to designate unicellular proto-organisms. This use will undoubtedly appeal to biologists far more than the meaning usually accorded to the word whereby it refers to differentiation based on size. The color of the yellow snow was attributed to the presence of the *Diamylon nivale* among the microphytes examined.

LEON DOMINIAN.

ANTHROPOGEOGRAPHY

La Géographie Humaine. Essai de classification positive. Principes et exemples. Par Jean Brunhes. 2ème édition, revue et augmentée. xv and 798 pp. Maps, ills., index. Félix Alcan, Paris, 1912. Fr. 20. 10 x 6½.*

Two chapters (8 and 10) in which topics of recent progress in the study of geography are discussed have been partly rewritten and extended. In amplifying his comments on the value of regional studies in the sense implied by the German term of "Länderkunde" Brunhes adheres more firmly to his previous stand according to which regional geography must be regarded as the ultimate object of research instead of as a preliminary investigation.

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[1] For general correlation see Groll's Map of the Atlantic Ocean in *Veröffentl. d. Inst. f. Meeresk.* Neue Folge: A, Heft 2, Taf. 1, Berlin, 1912.

*See review of the first edition by Mark Jefferson in the *Bulletin*, Vol. 43, June, 1911, pp. 467–469.

The credit to which the author is chiefly entitled is due to his admirable application of the positive method to geographical investigation. It was only by the introduction of the element of systematic coordination that he was able to muster the facts of human geography in their exact relations. Much remains to be added to his work but the book is bound to remain for a long time to come a most prolific source of suggestiveness and one which no geographer can afford to ignore. Therein its merit exceeds its value as a treatise on human geography.

The edition differs slightly on the whole from the first. In both, the clear vision of the geographical factor underlying natural manifestations on the surface of the earth is evoked. Whether the description given refers to one of man's special industries or to the spread of a disease, or of a race, the salient note is that of relation to locus on our planet's surface. In asserting that, when regarded from the standpoint of pure geography, there can exist no difference between a city avenue and a river or between a block of houses and a craggy pile of mountains, Brunhes has not merely confined himself to giving expression once more to the most modern conception of geography as a science. He has actually gone a step further and ascribed by the very same assertion the science's true place in the investigation of nature as a unit towards which all human study must ultimately converge after it has reached a certain stage of development.

The line of demarcation between ethnography and human geography is sharply laid out. The example thus given deserves being followed, as the tendency to include mere descriptions of customs under the heading of geography is not uncommon. LEON DOMINIAN.

The Sea Trader, His Friends and Enemies. By David Hannay. xi and 388 pp. Ills., index. Little, Brown & Co., Boston, 1912. $3.75. 9 x 6.

This history of the sea trade from its earliest recorded beginnings to the advent of large and well-equipped services is an intensely human story. The sea trader has been neglected for the more romantic tales of the discoverer, the privateersman or the pirate, but now it is possible to read of the evolution of shipping from the standpoint of world commerce. As a whole the book is new, and familiar stories of the sea have been omitted. When, however, the sea trader comes into contact with the dominant powers of the sea as the pirate, the angle of vision changes. The book has much of adventure in the opening of ocean routes in the various seas, considers cargoes and sailors and supplies a picture of the life of these sailors under the changing conditions. An impressive chapter on the slave trade stands out as a dark page of the sea trader's history.

ROBERT M. BROWN.

ECONOMIC AND COMMERCIAL GEOGRAPHY

Coal and What We Get from It. A Romance of Applied Science. By Raphael Meldola. 210 pp. Ills., index. Society for Promoting Christian Knowledge, London, 1905. 2s. 6d. 7 x 5.

The title is somewhat misleading, as a few pages only are devoted to the origin, geological relations and geographical distribution of coal. The book belongs in the field of chemical technology and is a semi-popular account of the various derivatives of coal tar. Among the products now common, whose derivation is treated, are the various dyes, including artificial indigo, coal-tar products used in pharmacy, saccharin, aromatic perfumes and substances used in photography. Each product is discussed chemically and historically as well. Notwithstanding the omission of chemical formulæ, the book is not easy reading for the non-chemist. It is not, therefore, a precise use of terms to call the volume a "romance of applied science." The title of the work is used as a running headline throughout, a plan which is as perplexing to the reader, as it is a needless waste of type and space. A. P. BRIGHAM.

OCEANOGRAPHY

Waves of the Sea and Other Water Waves. By Vaughan Cornish. 374 pp. Ills., index. T. Fisher Unwin, London, 1910. 10s. 9 x 6.

Every geologist should welcome this critical and fairly comprehensive treatment of the subject of water waves by the foremost authority upon wave action

in connection with geological processes. The first part (138 pp.) is devoted to a critical discussion of the size of storm waves at sea based upon the author's own and other observations. It is found that measurements of wave height taken from ships and based upon the eye elevation at which the horizon is just eclipsed by the wave crest, if suitably corrected, correspond well with those determined from the period and velocity of the wave, though the latter method is on the whole the more reliable. The method of determining the period at sea when the ship's course is parallel to and in the same direction as the progression of the wave, is by noting both the time interval which separates the arrival of successive waves and, further, the time required for these to travel the known length of the ship. The fairly concordant results determined by various observers when properly corrected make the height of the large waves during ordinary strong gales on both the North Atlantic and North Pacific practically constant and "not less than 43 feet," though peaks of water due to cross seas may reach a height of 60 feet. In the extreme southern ocean, where land areas are not present to limit the fetch of the prevailing westerly winds, much higher values have been measured.

The measurement of the wave length is less simple, since this does not maintain a perfectly constant relation to wave height. Shortly after the strong wind has begun to blow, the waves are relatively steep and short, but after a sufficient time has elapsed their form becomes nearly constant with a wave length about fifteen times the wave height. For all save the southern oceanic areas this wave length is believed to vary but little from 600 feet in the case of heavy storms. Figures more than twice as great have, however, several times been noted by reliable observers in the extreme southern ocean.

To the waves of the sea which are of longer or shorter period than the "dominant" wave (and hence of longer or shorter wave length and of greater or of less height), Dr. Cornish has devoted less attention than would be desirable. The so-called *swell*, or the principal wave of higher order of magnitude, was studied especially through its breakers at Branksome Chine after the great mid-Atlantic storms of December, 1898. These swells were found to have a period of 19 seconds, which showed that in deep water they must have had a wave length about three times that of the dominant wave (1850 feet) and a velocity of progression of not less than 66.5 statute miles per hour—more than a mile per minute. In a case examined by Abercrombie the height of the swell was determined to be about one-half the height of the visible or dominant wave which the eye clearly perceives.

The waves of lower order superimposed upon the dominant ones, which, during a strong gale on the Atlantic, the reviewer has counted to at least five distinct orders in parallel series, Dr. Cornish has not treated in this work. While it is undoubtedly true, as he observes, that these waves of lower order are not fitted to travel far after subsidence of the wind, they are none the less extremely instructive in revealing the nature of the counteraction of the waves upon the air currents to produce eddies and minor undulations within the lower strata. While perhaps not so important over the sea, such motions become of extreme importance in connection with sand-blast etching of rock in desert regions.

In his study of "The Action of Sea Waves to Transport Shingle, Sand and Mud," Dr. Cornish brings out the important fact that the normal depth of the edge of the continental shelf (600 feet) is so determined because storm waves with wave length of 600 feet are effective in transporting rock particles down to this depth from the surface, a fact which the reviewer has elsewhere emphasized. The correspondence is in reality even more striking than Cornish assumes, for about the Antarctic continent where wave lengths more than twice the "normal" have a number of times been measured, the depth of the continental shelf margin is likewise more than double the usual figure of 600 feet. The valuable expression *wave base*—the base of effective transportation of rock debris at a depth one storm-wave length below the surface—he does not, however, employ.

The treatment of the movement of shingle by storm waves is on the whole the least satisfactory portion of the work, and, while the observations are of interest, the conclusions are the less reliable because too little attention has been given to studies by other and especially by non-British students of the subject.

No mention is made, for example, of the classical studies by Gilbert upon shore action. The contention of Dr. Cornish that pebbles along the shore are reduced in size mainly through fracture, and not by attrition, must meet the objection that shingle beds reveal few fractures and almost uniformly present watch-shaped individuals; as it must also meet the known fact that pebbles are lifted but slightly in their movements and cushioned by the water during impact.

The work is concluded by interesting chapters upon the waves of rivers, including bores, curious results of the meeting of waves from different directions, etc. The forty-nine plates which adorn the work are of interest, and, like the letter press, they are a credit to the publisher.

WILLIAM HERBERT HOBBS.

The name of Vaughan Cornish has been identified for many years with the study of waves. In geographical sciences he is the specialist on this subject. His book is therefore full of personal observations. Cornish did not gather the facts as they came. He has crossed the oceans many times in order to observe himself all the particulars of the stormy sea, he has spent weeks and months at seashores, at Niagara and other water falls, at rivers, canals and lakes, always observing, always thinking of one thing: the waves.

Cornish has the critical mind of a well-trained scientific man, he has the enthusiasm of a lover of nature and he never leaves the ground of observed facts in favor of logical reasonings leading to sensational theoretical generalizations. In order to verify his reasonings he prefers to consult nature.

The present book consists of three parts: in the first Cornish studies the size and speed of deep-sea waves; in the second he treats the subject of the action of sea waves to transport shingle, sand and mud, and in the third he gives a good deal of information on stationary and progressive waves in rivers. The illustrations are excellent, the style is good and the book is pleasurable reading. Tourists crossing the ocean will be benefited by reading this instructive guide. The book ought to be in every library on transatlantic steamers.

HENRYK ARCTOWSKI.

MATHEMATICAL GEOGRAPHY AND CARTOGRAPHY.

Plane Surveying. Text and reference book for the use of students in engineering and for engineers generally. By Paul C. Nugent. 3d edition, revised. xxii and 599 pp. Diagrams, index. John Wiley & Sons, New York, 1911. 9 x 6.

Topographic, Trigonometric and Geodetic Surveying, including geographic exploratory and military mapping. With hints on camping, emergency surgery and photography. By Herbert M. Wilson. 3d edition. xxx and 912 pp. Maps, ills., index. John Wiley & Sons, New York, 1912. $3.50. 9 x 6.

New astronomical tables, extending through 1928, have been added to the last edition of the first of these two books. Another innovation consists in the replacing of Appendix C on the "Restoration of Lost or Obliterated Corners" by the latest revision of the circular on this subject issued by the U. S. General Land Office, which refers to the entire subject of resurveys.

The third edition of the second book differs little from the previous two issues. A few minor changes and corrections occur occasionally.

Both works still retain their high rank among similar publications in the United States. Although the first is avowedly destined for the use of students in engineering, or for engineers alone, it may well find a useful place in a geographer's library. The study of the subject-matter of the second being part of a geographer's training, it is not amiss to state that familiarity with its contents is indispensable to followers of this science. Topographers, geodesists and cartographers will find in it practically all the information needed for their work.

LEON DOMINIAN.

Determination of Time, Longitude, Latitude and Azimuth. By William Bowie. 5th edition. 177 pp. Ills., index. *U. S. Coast and Geod. Surv. Special Public No. 14.* Washington, 1913.

This is the fifth edition of the astronomical manual published by the U. S. Coast and Geodetic Survey for the use of its observers in the field and its computers in the office in carrying on geodetic astronomy. The subject matter includes much that was printed in the fourth edition, which appeared as Appendix 7 of the Report of the Superintendent of the Survey for 1898.

Some of the most important additions to the previous edition are: the determination of time and longitude, using the transit micrometer; the description of the transit micrometer; determination of time with the vertical circle for use in connection with azimuth observations; a description of the method of observing azimuth coincidently with horizontal directions in primary triangulation; an example of the determination of an azimuth in Alaska with a transit equipped with a transit micrometer; examples of the records and computations in the different classes of work, as actually made at present by the Survey; and statements of the field cost of the different classes of work. There are also shown a number of new illustrations and several tables which were not given in the previous edition.

The derivation of the formulæ is given only in the rare cases where they cannot be found in the standard text books on astronomy. In addition to this manual the observer will require the American Ephemeris and Nautical Almanac for the year of observation, in time and azimuth work, and the Boss Preliminary General Catalogue and the Cape Tables by Finlay, in latitude determinations. Of course, other catalogues and tables of a similar nature may be used instead of the publications mentioned.

The examples shown in the different classes of work are carried from the observations through the steps in the computation to the probable error of the results. Sufficient explanation is given to enable one to understand the various processes.

The instructions given in the manual for the several classes of work state what degree of accuracy is required for the results. The manual is especially intended for use in field astronomy, as carried on by the U. S. Coast and Geodetic Survey, but it may also serve as a guide to any one engaged in geographical explorations who does not require such a high degree of accuracy as that maintained in the work of the Survey. WILLIAM BOWIE.

PHYSICAL GEOGRAPHY

The Work of Rain and Rivers. By T. G. Bonney. Cambridge Manuals of Science and Literature. 144 pp. Ills., index. G. P. Putnam's Sons, New York, 1912. 40 cents. 6½ x 5.

Dr. Bonney's little work does not profess to instruct the professional student, but is fitted to interest the general reader concerning some of the more common changes produced upon the surface of the lands. The headings of the five chapters convey a true notion of the content of the volume. They are: Carving and Carrying; The Making of Valleys; The Transport and Deposit of Materials; The History of a River System; Man's Learning of Nature's Lessons.

The author, as might be expected, reveals somewhat conservative views on certain subjects, such as the origin of cirques and hanging valleys, but he avoids controversy. Concrete examples of the phenomena treated are abundant and offer useful material to the teacher. Frequent references to localities in Great Britain and Switzerland bespeak the author's prolonged familiarity with those countries. There are a number of diagrams and half tones. The photographs used deserve a much better reproduction than they have received.

A. P. BRIGHAM.

A Laboratory Manual of Physical Geography. By Prof. R. S. Tarr and O. D. von Engeln. For use in connection with a general course in physical geography in high and secondary schools and in colleges. xvii and 362 pp. Maps. Macmillan Co., New York, 1911. 9½ x 8.

An examination of this volume brings home anew the sense of profound loss sustained not only by his friends, but by the science of geography, in the death of the senior author. For many years, by his personal instruction and through his text books, he had been leading thousands of American youth into the wealth

of modern geography. In this manual he and his collaborator have manifested the enthusiasm, the ingenuity and the unrelenting purpose which marked the career of the senior author.

The method of the manual efficiently meets the rather widespread criticism that physical geography has been dehumanized, or made ultra-formal and scientific. Such criticism may be justly applied to some teachers, but, as this outline shows, the limitation is not inherent in the subject. In almost every exercise, questions will be found which require thoughtful attention to geographical conditions as affecting the life of man.

As the setting apart of laboratory periods in high schools is a matter of some difficulty, teachers will welcome the features of this manual which simplify preparation and make rapid work possible. Thus, we find at the head of each exercise a list of the materials needed. This is followed by a statement of the purpose of the exercise, and by a short explanatory introduction. After each question, space is left for the answer, a plan which not only aids the pupil but saves much of the teacher's time in examining work. Maps, figures, diagrams and tables appear at the points where they are needed, and extra blank sheets can be readily bound in, if more intensive treatment is desired at any point. Several typical field outlines are introduced, as guides to autumn and spring excursions.

There are nine exercises covering the earth as a globe, including maps, eight on rocks, minerals and soils, and twenty-seven studies of the physiography of the lands. When the section on the lands is completed, the student will have had a comprehensive review of the main geographical regions of the United States. We find, for example, on the regions west of the Rocky Mountains, exercises on the Columbia lava plateaus, the Great Basin, the Colorado Canyon and Plateaus, the Yosemite Valley, Mount Shasta and the surrounding region, the piedmont valleys of the Pacific slope, and on the Pacific ranges and the harbor of San Francisco.

The manual includes magnetism, the ocean, life zones, and an ample series of exercises on the atmosphere. A. P. BRIGHAM.

OTHER BOOKS RECEIVED

These notes do not preclude more extended reference later

NORTH AMERICA

GLI ESCHIMESI. La razza—Gli usi e i costumi—Folklore. Di Arnaldo Faustini. La Civiltà Contemporanea, N. 13. viii and 204 pp. Ills. Fratelli Bocca, Torino, 1912. L. 3.50. 7½ x 5.

SCARBOROUGH'S ROAD MAP AND MOTOR GUIDE OF MINNESOTA. xlviii and 848 pp. Maps. SCARBOROUGH'S ROAD MAP AND MOTOR GUIDE OF MISSOURI. c and 536 pp. Maps. The Scarborough Co., Indianapolis, Ind., 1913. $1 each. 9½ x 5½ each. [Both of these guides give evidence of having been compiled very carefully. The exceedingly large number of landmarks recorded for each road should meet the requirements of the most exacting motorist.]

MONUMENTACION DE BANCOS EN EL RIO BRAVO DEL NORTE (o Rio Grande) ejecutado conforme a la convencion de Bancos del 20 de Marzo de 1905. Segunda Serie. Bancos Numeros 59 a 89. Años de 1910–12. Com. Int. de Lím. entre Mex. y los E. U., Sec. Mex. iv and 103 pp. Maps, index. Imprenta de Murguia, Mexico, 1912. 12 x 9. [Technical proceedings of the attempt to adjust variations in the U. S.-Mexican boundary line arising from the shifting bed of the Rio Grande. Contains an account of the survey of 21 new sand bars (locally known as "bancos") cut off since 1898 and an old one missed in the course of the operations undertaken at that date. Topographic detail of the maps is of value. Importance of the work due to problems of national jurisdiction which originate with the displacements of this section of the boundary line.]

CENTRAL AMERICA

PANAMA-CANALEN I 1912. By C. P. O. Moltke. v and 138 pp. Maps, ills. Gyldendalske Boghandel, Copenhagen, 1912. Kr. 3.50. 8½ x 6.

SOUTH AMERICA

MEMORIA SOBRE EL RÍO PARANÁ. Por José Repossini. 151 pp. Ills. Ministerio de Obras Públicas, Argentina, Buenos Aires, 1913. 11 x 7½. [Hydrographic operations on the Paraná from the Río de la Plata to Corrientes and Posada are described. Illustrates remarkably well the type of work executed in South America to render the larger continental rivers navigable to ocean-going steamers.]

AFRICA

THE TRAVELLER'S HANDBOOK FOR ALGERIA AND TUNISIA. xii and 416 p. Maps, plans, ills., index. Thos. Cook & Son, London, 1913. 5s. 6½ x5. [General travel information which is especially valuable to those about to make their first trip within these regions.]

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UNTERSUCHUNGEN ÜBER EINE MELANESISCHE WANDERSTRASSE. Von Dr. Georg Friederici. Wissenschaftliche Ergebnisse einer amtlichen Forschungsreise nach dem Bismarck-Archipel im Jahre 1908, III. 182 pp. Map. *Mitteilungen*

aus den Deutschen Schutzgebieten Ergänzungsheft Nr. 7. E. S. Mittler & Sohn, Berlin, 1913. 13 x 10. [Results of investigations on Melanesian migrations, based on anthropological, ethnological and philological comparisons. Determination of the routes of Philippine wanderings beyond New Guinea to the New Hebrides. With a lengthy source-index.]

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The Forest Trees of Britain. By the late Rev. C. A. Johns. Revised by G. S. Boulger. 10th edition. xiv and 431 pp. Ills., index. Society for Promoting Christian Knowledge, London, 1912. 6s. 8 x 5½. [British trees are shown to be related to those common to the great plain of northern Europe. Their essential and artistic characters together with the main mass of lore which concerns them are presented in readable form. The revision includes emendations rendered desirable by recent advances in the knowledge of the subject. Not written from the technical standpoint of the botanist or the forester but deserving none the less the appreciation of the forest lover.]

Photographic Supplement to Stanford's Geological Atlas of Great Britain and Ireland. Arranged and Edited by Horace B. Woodward with the cooperation of Miss Hilda D. Sharpe. 113 pp. Index. Edward Stanford, Ltd., London, 1913. 4s. 7½ x 5. [Of high educational value. The photographic views of areas geologically mapped referred to their respective atlas sheets will enable students to familiarize themselves readily with natural conditions while in the class-room, thereby preparing themselves for better field-work.]

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POLAR

Über Grönlands Eisberge. Von Arnold Heim. 7 pp. Ills. Neujahrsblatt, Naturforschenden Gesell. in Zürich, 1911, 113. Stück. 11 x 9. [Remarkable photographs accompanied by brief descriptions of icebergs seen in the summer of 1909.]

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ADMIRALTY MANUAL FOR THE DEVIATIONS OF THE COMPASS. Originally edited in 1862. By F. J. Evans and Archibald Smith. 7th edition. ix and 216 pp. Diagrams. J. D. Potter, London, 1901 (reprinted 1912). 3s. 9½ x 6. [A justifiable reprint containing practical data to facilitate the study of the effects of soft iron in producing deviations. Also formulæ for the investigation of ship's magnetism when the deviations are great.]

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A HANDBOOK OF FORESTRY. By W. F. A. Hudson. 82 pp. Ills., index. The Cooper Laboratory for Economic Research, Watford, 1913. 2s. 6d. 10 x 7½. [Elementary introduction to the general principles affecting the production of the maximum amount of marketable timber from a given area.]

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PROSPECTOR'S AND MINER'S MANUAL. A Practical Reference Book for the Use of Prospectors, Miners, Investors, and Mining Men; with a Description of the Principal Mining Districts in each State. By O. H. Parker. 301 pp. Ills. Justinian Caire Co., San Francisco, Cal. Brown & Potter, San Francisco, Cal., 1913. $3. 9½ x 6. [A compilation of data which tend to eliminate the element of chance in prospecting. Relation between geological features and mineralized areas indicated. Stress laid on the importance of metamorphism. With state maps showing distribution of minerals.]

THE LAW OF THE PAY-STREAK IN PLACER DEPOSITS. By J. B. Tyrrell. Reprint, *Trans. Inst. of Mining and Metallurgy*, 21st Session, 1911–12, pp. 593–605. Diagrams. London. 8½ x 5½. [The conclusion is set forth that the pay-streak represents the bottom of the young V-shaped valleys in which they are formed.]

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

For system of listing maps see p. 75 of this volume

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

Maps Accompanying Publications

Alaska. (a) Reconnaissance Map of Seward Peninsula, Alaska. 1913. 1:500,000. 66°40′ - 64°0′ N.; 168½° - 160¾° W. 5 colors.

(b) Geo'ogic Map of Seward Peninsula, Alaska. Compiled and arranged by Philip S. Smith. 1:1,500,000. 66°40′ - 64°18′ N.; 168½° - 160½° W. 9 colors.

(c) Sketch map of Nome region, showing distribution of placers. [1:120,000.] 64°40′ - 64°30′ N.; 165°35′ - 165°17′ W.]

Accompany, as Pls. I and IV and Fig. 5 respectively, "Surface Water Supply of Seward Peninsula, Alaska" by F. F. Henshaw and G. L. Parker, *Water-Supply Paper 314*, 1913.

[Map (a) an important topographic map (relief in contours; interval 200 ft.) combining into one the various maps of parts of the Seward Peninsula hitherto published by the Survey. Gold placers, river-gaging and rainfall stations are shown on it. Map (b) is a valuable compilation of the geology. Map (c) differentiates between (1) stream bench and beach placer deposits, (2) high bench placer deposits.]

Alaska. Geologic Reconnaissance Map of the Sitka and Juneau Mining Districts. After F. E. and C. W. Wright. [1:1,800,000.] 60° - 56° N.; 138½° - 131° W. Oriented N. 29° E. Accompanies, as Pl. I, "The Sitka Mining District, Alaska" by A. Knopf, *Bull. 504*, 1912.

California. General Geologic and Topographic Map and Sections of the Eagle Mountain Iron-Ore District, California. By E. C. Harder and J. L. Rich. 1912. [1:12,000.] [33°52′ N. and 115°35′ W.] 9 colors. Accompanies, as Pl. I, "Iron-Ore Deposits of the Eagle Mountains, California" by E. C. Harder, *Bull. 503*, 1912.

[The Eagle Mts. are a desert range in the Colorado Desert of southern California.]

Texas. Geologic Sketch Map of the Wichita Region, North-Central Texas. 1912. Base compiled from R. T. Hill's map of Texas in Topographic Folio 3, U. S. Geological Survey, and U. S. Post Route map of Texas. [1:950,000.] 34°25′ - 32°55′ N.; 99°57′ - 97°30′ W. Accompanies, as Pl. I, "Geology and Underground Waters of the Wichita Region, North-Central Texas" by C. H. Gordon, *Water-Supply Paper 317*, 1913.

[Geology superimposed on topography (relief in contours: interval 250 ft.).]

Washington. Map of South-Central Washington Showing Locations of Wells and Springs and Approximate Extent of Geologic Formations. Base from reconnaissance map, Northern Transcontinental Survey, by R. W. Gordon, detail maps by U. S. Geological Survey and U. S. Reclamation Service. [1:750,000.] 46°42′ - 45°43′ N.; 120°42′ - 118°53′ W. 1 color. Accompanies, as Pl. I, "Geology and Water Resources of a Portion of South-Central Washington" by G. A. Waring, *Water-Supply Paper 316*, 1913.

NORTH AMERICA

United States—Canada. L'industrie du fer dans la région des Grand Lacs, . . . d'après le Carte de l'United States Steel Corporation. 1:12,500,000. 49°-38° N.; 95° - 65° W. Accompanies, as Fig. I, on p. 121, "Duluth" by A. Demangeon, *Ann. de Géogr.*, Vol. 22, 1913 (March 15), pp. 120–133.

UNITED STATES

Wyoming. (a) Esquisse tectonique du Parc du Yellowstone et des montagnes voisines. 1:1,500,000. 45°35′ - 43°52′ N.; 111°8′ - 109°30′ N.

(b) Carte du Parc du Yellowstone pour servir a l'étude des captures récentes. 1:800,000. [45°3′ - 44°0′ N.; 111° - 110° W.]

Accompany, as Figs. 1 and 4, on pp. 139 and 144, respectively, "Le Parc National du Yellowstone: Étude Morphologique" by E. de Martonne, *Ann. de Géogr.*, Vol. 22, 1913 (March 15), pp. 134–148.

[Map (a) shows faults, uplifted and depressed blocks; map (b) shows areas above 10,000 ft. in altitude, extent of Yellowstone Lake at the end of the Glacial Period, the geyser basins, the principal cascades, and the passes which might have served as outlets to the waters of the lake at the end of the Glacial Period.]

CENTRAL AMERICA AND WEST INDIES

Nicaragua. Entwurf von Höhenschichtlinien der mittleren Vulkanregion Nicaraguas. Von Dr. Karl Sapper. Auf Grund der Map XIX, Corps Nr. 1, Intercontinental Railway Survey, ferner der Aufnahmen von J. Wiest, E. Müller, C. Castellon, A. Cardenas, Dr. Bruno Mierisch, sowie eigener Aufnahmen aus den Jahren 1897–1899. 1:300,000. 13°10′ - 11°20′ N.; 87°20′ - 85°40′ W. Oriented N. 41° W. 3 colors. With two insets: (1) Karte des Masaya-Sees. Aufgenommen von J. Wiest, E. Müller u. A. Cardenas. 1:50,000. [11°57′ N. and 86°8′ W.] 3 colors. (2) Apoyo-See: Linie von E. Müller am 4. September 1899 ausgelotet. 1:50,000. [11°54′ N. and 86°3′ S.] 1 color. Accompanies, as Pl. 50, paper with same title by same author, *Pet. Mitt.*, Vol. 59, I, 1913, June, pp. 310–311.

[Map on a relatively large scale of the series of volcanoes extending from Lake Nicaragua to Fonseca Bay. The contours used to show their relief (interval

100 meters) the author states are merely approximate. Lava fields, railroad, and author's routes shown.]

SOUTH AMERICA

Bolivia. Die Bolivische Ostkordillere: Westlicher Teil. Nach eigenen Aufnahmen von Dr. Theodor Herzog. 1:500,000. [16°35′ - 17°56′ S.; 67°0′ - 65°25′ W.] 5 colors. Accompanies, as Taf. 38, "Die bolivischen Kordilleren" (second part) by T. Herzog, *Pet. Mitt.*, Vol. 59, I, 1913, May, pp. 247–250.

[Important map of the ill-known western part of the Cordillera Oriental, northwest of Cochabamba. The part of the range represented adjoins to the southeast the Cordillera of Quimzacruz of which Dr. Herzog's map was published in the previous number of *Petermanns Mitteilungen* (see *Bull.*, Vol. 45, 1913, No. 8, p. 637, map (3) under "Bolivia"). Relief in brown contours and shading in gray, areas over 4,500 meters in altitude in brown, drainage in blue, author's route in red. Upper limit of trees shown.]

AFRICA

Algeria. Répartition de la Langue Berbère en Algerie. Par E. F. Gautier. 1:3,800,000. 38° - 31⅛° N.; 2⅜° W. - 9° E. 2 colors. Accompanies, as Pl. XIII, paper with same title by same author, *Ann. de Géogr.*, Vol. 22, 1913 (May 15), pp. 255–266.

[Shows the present distribution in Algeria of Berber in contrast to Arabic, on the basis of an official census made in 1910. Territory linguistically lost by the Berbers since the last similar census in 1860 is shown, also the ancient Roman *limes*, as Roman suzerainty seems to have been a conserving factor against the subsequent ingressions of Arabic.]

French Equatorial Africa—Anglo-Egyptian Sudan, etc. Carte du Bassin du Haut M'Bomou. [1:10,800,000]. 10¾° - 3½° N.; 20½° - 30½° E. Accompanies, as Fig. 27 on p. 313, "Les Confins de l'Oubangui-Chari et du Soudan égyptien" by R. Duguay, *La Géogr.*, Vol. 27, 1913, No. 4, pp. 312–314.

[Ill-known region comprising the divide between the Ubangi (Congo) and Bahr el Ghazal (Nile) drainage systems, based on the explorations of Capt. M. Martin from who e book, "Au couer de l'Afrique équatoriale," the map is extracted.]

German Southwest Africa. Karte des Küstengebietes zwischen Hottentottenbucht und Empfängnisbucht. 1:400 000. [In two parts:] (1) Nordblatt. 23°54′ - 25°2′ S.; 14°23′ - 14°56′ E. 3 colors. (2) Südblatt. 25°2′ - 26°11′ S.; 14°42′ - 15°1′ E. 3 colors. Accompanies, as Karte 1, "Eine Reise längs der Küste Lüderitzbucht-Swakopmund im Februar-März 1912" by E. Reuning, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 26, 1913, No. 1, pp. 118–126.

[Coastal strip approximately between Walfisch Bay and Lüderitzbucht, characterized mainly by drifting sand dunes.]

German Southwest Africa. Das Kaokofeld (Deutsch-Südwestafrika) nach vorhandenem Material and eigenen Aufnahmen von Dipl.-Ing. J. Kuntz konstruiert und gezeichnet von W. Rux. Kartograph. Institut von Dietrich Reimer (Ernst Vohsen). 1:800,000. 16°45′ - 21°30′ S.; 11°30′ - 15°33′ E. 4 colors. Accompanies, as Karte 7, "Erläuterung zur Karte des Kaokofeldes" by J. Kuntz, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 25, 1912, No. 3, pp. 233–235.

[Valuable map of the northwestern corner of German Southwest Africa. Relief in approximate contours in brown, drainage in blue, open plains in green, occurrences of the more important mammals, route of the author and other employes of the Kaoko Land and Mining Company in black; separate symbol for mineral occurrences.]

Kamerun. Die Regenmess-Stationen in Kamerun. 1911. 1:5,000,000. 13½° N. - 2° S.; 8° - 19° E. 2 colors. With inset: Die Regenmess-Stationen am Kamerun-Gebirge. 1:500,000. 4⅓° - 4° N.; 8°57′ - 9°30′ E. 1 color. Accompanies, as Karte 8, "Bericht über das meteorologische Beobachtungswesen in Kamerun im Jahre 1911" by H. Marquardsen, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 25, 1912, No. 4, pp. 319–330.

[Meteorological stations underlined in red.]

Portuguese West Africa—German Southwest Africa. Karte des Deutsch-Portugiesischen Grenzgebiets in Südwestafrika. Bearbeitet unter Leitung von Paul Sprigade von H. Nobiling und W. Rux. Das portugiesische Gebiet auf Grundlage einer Bearbeitung von Dr. Max Groll. Blatt 1. 1:500,000. 15° - 19° S. 11°25′ - 15°15′ E. 5 colors. Accompanies, as Karte 9, "Zur Karte des Deutsch-Portugiesischen Grenzgebiets in Südwestafrika," *Mitt. aus den Deutschen Schutzgeb.*, Vol. 25, 1912, No. 4, pp. 330–331.

[Important map on relatively large scale of the southwestern corner of Angola and the northwestern corner of German Southwest Africa. Relief in brown shading, drainage in blue, explorer's routes in black, boundaries of the land grants awarded to the exploiting companies in violet. This is the first of three sheets which this map will comprise.]

Rio de Oro and Mauretania. Régions au Nord et Nord-Ouest de l'Adrar: Levées et Assemblées par le Lieutenant G. Schmitt de l'Inf. Coloniale. 1:2,000,000. 25½° - 19½° N.; [17½° - 9° W.] Oriented N. 18° E. 1 color. Accompanies, as Pl. 3, "Le Sahara occidental: Régions au nord et au nord-ouest de l'Adrar mauritanien" by G. Schmitt, *La Géogr.*, Vol. 27, 1913, No. 4, pp. 241–261.

[Important map of the ill-known hinterland of the Rio de Oro coast in the westernmost Sahara. The limits of the natural regions are shown. Numerous symbols distinguish between the different types of plateaus and escarpments. The quartz ridges and granitic domes are shown; also the sand dunes, the depressions without outlet and the springs (three types each). The author's routes show how thoroughly he crossed the region in every direction.]

ASIA

Turkey in Asia. Réduction d'une Carte d'Itinéraires en Syrie. Dressée d'après les Travaux de MMrs. les Généraux de Torcy et Marmier. 1:1,000,000. 37°40′ - 31°40′ N.; 34°55′ - 38°5′ E. Accompanies, as Pl 2, "Notes sur la Syrie" (first part) by De Torcy, *La Géogr.*, Vol. 27, 1913, No. 3, pp. 161–196.

[Important map embodying the route surveys of the author extending from the Gulf of Alexandrette to the Dead Sea, valuable especially for the less known section north of the Homs-Tripoli railroad. Relief in generalzed contours in black. The map is a good example of the possibilities of expression even in black-and-white only.]

AUSTRALASIA AND OCEANIA

Kaiser-Wilhelmsland. Vorläufige Karte des Gebietes des Kaiserin-Augusta-Flusses (Sepik). Nach den neue ten Forschungen, besonders nach den Aufnahmen von Prof. Dr. L. Schultze und Dr. W. Behrmann zusammenge stellt von M. Moisel. 1:2,000,000. 2°27′ - 5°16′ S.; 140°54′ - 145°25′ E. 5 colors Accompanies, as Karte 2, "Begleitworte zu der vorläufigen Karte des Kaiserin-Augusta-Flusses (Sepik)" by M. Moisel, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 26, 1913, No. 1, p. 126.

[Valuable map incorporating all the new surveys of the Sepik River in German New Guinea, especially those recently made by Dr. Behrmann which were first published in the *Zeitschrift der Gesell. für Erdk.* and the *Deutsches Kolonialblatt* (see July *Bull.* under "Kaiser-Wilhelmsland," p. 559).]

EUROPE

France. Carte des Régions Naturelles du Département du Gard. 1:900,000. [44°28′ - 43°25′ N.; 3°4′ - 5°0′ E.] Accompanies, on p. 199, "Les régions naturelles du département du Gard" by P. Lemoine, *La Géogr.*, Vol. 27, 1913, No. 3, pp. 197–202.

[Natural divisions, based mainly on the geology, of the region to the west of the lowest course of the Rhone.]

France. Capture de la Moselle par la Meurthe. [48°47′ - 48°32′ N.; 5°35′-6°8′ E.] [1:400,000.] Accompanies, as Fig. 19, "La preuve définitive de la capture de la Moselle par la Meurthe" by P. Lemoine, *La Géogr.*, Vol. 27, 1913, No. 3, pp. 211–212.

[Reprinted from "Géologie du bassin de Paris" by Paul Lemoine, Paris, 1911.]

Germany. (a) Karte der Eisenbahnfernen Bayerns in Abständen von 5 zu

5 km. Entworfen von K. Kimmel. 1:1,500,000. 50⅓° - 47° N.; 9° - 14°E. 4 colors.

(b) Personenzughäufigkeitskarte für das Königreich Bayern, Winter 1910–11. Entworfen von K. Kimmel. 1:1,500,000. [Same coordinates as map (a).]

Accompany, as Pls. 42 and 43, "Einige Beiträge zur Eisenbahngeographie Bayerns" by K. Kimmel, *Pet. Mitt.*, Vol. 59, I, 1913, June, pp. 296–300.

[Map (a) shows the accessibility of all parts of Bavaria by means of lines of equal distance from the nearest railroad (interval 5 kilometers); map (b) shows diagrammatically, by means of thickness of line, the intensity of passenger traffic on the Bavarian railroads.]

Germany. Temperaturanomalien und Luftdruckverteilung im Hochsommer und Frühherbst 1911 und 1912. Von Albert Knörzer. [Twelve maps of Germany, 1:20,000,000 (1 color), divided into two parts, entitled:] I. Temperaturmittel und Isanomalen im Juli, August und September 1911: (1) Temperaturmittel, Juli 1911. (2) —, August 1911. (3) —, Sept. 1911. (4) Isanomalen, Juli 1911. (5) —, August 1911. (6) —, Sept. 1911. II. Temperaturmittel und Isanomalen im Juli, August und September 1912. (1) Temperaturmittel, Juli 1912. (2) —, August 1912. (3) —, Sept. 1912. (4) Isanomalen, Juli 1912. (5) —, August 1912. (6) —, Sept. 1912. Accompany, as Taf. 34 and 35, "Temperaturanomalien und Luftdruckverteilung im Hochsommer und Frühherbst 1911 und 1912" by A. Knurzer, *Pet. Mitt.*, Vol. 59, I, 1913, May, pp. 232–237.

Russia. (a) [Extract from] Carte spéciale de la Russie d'Europe, éditée par la Section topographique de l'État-Major (1:420,000), feuille 39. 1888. 1:1,200,000. 64°10′ - 62°40′ N.; 33°0′ - 35°30′ E.

(b) Carte du district de Povênets (1:420,000), éditée par la Zemstvo, 1910. 1:1,200,000. Same coordinates as map (a).

Accompany "De Povênets à Arkhangel'sk" by J. Legras, *Ann. de Géogr.*, Vol. 22, 1913 (May 15), pp. 245–254.

[Map (b) based on the map prepared by the local *zemstvo* in view of the insufficiency, for that region, of the official topographic map published by the General Staff shown on map (a). Region shown lies in glaciated lake district between Lake Onega and the White Sea.]

WORLD AND LARGER] PARTS

North Atlantic Ocean. Die Eislage an der Neufundland-Bank zur Zeit des Untergangs der "Titanic," am 14. April 1912. [Mean meridional] scale 1:6,250,000. 51¼° - 38½° N.; 75° - 37½° N. 2 colors. Accompanies, as Pl. 48, "Eisberge und Schiffahrt" by [H.] H[aac]k, *Geogr. Anz.*, Vol. 13, 1912, No. 7, pp. 162–163.

[Shows ice conditions on the day the *Titanic* sank, together with more southerly transatlantic routes agreed upon as a result thereof.]

CARTOGRAPHICAL

France. Bathymetrische Karten von Frankreich zur Veranschaulichung der Richtigkeit bathymetrischer Karten überhaupt. Von Prof. Julien Thoulet. Nach den in den Annales d'Institut [*sic*] Océanographique veröffentlichten Karten. [Four maps of France, etc. (1:6.000,000; 51¼° - 41⅓° N.; 6° W. - 10¼° E.) entitled:] 1. Lotungsdichte von 0.0001 (15 Lotungen auf einer Oberfläche von 153,821 Quadratmeilen). 7 colors. 2. Lotungsdichte von 0.0002 (31 Lotungen——). 9 colors. 3. Lotungsdichte von 0.001 (154 Lotungen ——). 10 colors. 4. Lotungsdichte von 0.002 (308 Lotungen ——). 10 colors. Accompanies, as Taf. 40, "Die Lotungsdichtekarten von J. Thoulet" by M. Groll, *Pet. Mitt.*, Vol. 59, I, 1913, May, pp. 250–257.

[Ingenious device to test the accuracy of bathymetrical charts in general. Based on the procedure suggested by Prof. Thoulet, four maps of France are shown on which varying numbers of "soundings" are considered to be known, *viz.*, 15 on the first, 31 on the second, 154 on the third and 308 on the fourth. The "isobaths" drawn in conformity with these "soundings" correspond to contours and allow of a direct comparison with the known relief of France. The test shows that only beginning with the third map (154 soundings) are the surface features of France reproduced even in the most general way. Such a dense

network of soundings—and still more so that used on the fourth map—is rarely available even for the shallower parts of the ocean, thus emphasizing the great caution with which all bathymetrical charts must be interpreted.]

ATLASES

Aschehougs Lommeatlas over Norge ved K. Gleditsch. 21 plates in colors, 26 pages of text with illustrations, index. Maps engraved by Kristiania Lith. Aktiebolag. H. Aschehoug & Co. (W. Nygaard), Kristiania, 1911. Kr. 2.85. 7½ x 5 inches.

[Good handy atlas of Norway covering the country in 15 maps in physical coloring on the scale of 1:1,000,000 and one of Finmarken in 1:2,000,000. There are also plans of Kristiania, Bergen and Trondhjem on the scale of 1:25,000 each and an index-map showing the extent of each plate. A description, with illustrations, of the regions most frequented by tourists and an index complete the atlas.]

A Literary and Historical Atlas of Asia. [By] J. G. Bartholomew, LL.D. (In series: Everyman's Library.) 69 colored and 16 black-and-white maps, gazetteer and index; also "A Brief Survey of the Coinages of Asia from the Earliest Times to the Present Day" by J. Allan, M.A. In all, 226 pp. J. M. Dent & Sons, London, and E. P. Dutton & Co., New York. 35 cents. 7 x 4 inches.

[The title hardly conveys the right impression of the contents. The publishers' statement that the series of four atlases to which this belongs is designed to illustrate the geography of the whole world more correctly defines their scope. Numerous maps showing the territorial development of various parts of Asia and several battle plans justify the use of "historical" in the title. The claim of "literary" is more precariously based on the reference to historical and other associations in the gazetteer, while the numismatic section, although valuable, is rather anomalous in such a publication. The maps which do belong there are considerably better than those usually found in a general atlas; this is no doubt due to the fact that they were prepared by the Edinburgh Geographical Institute. Thus, of Asia as a continent, there are orographical, hydrographical, temperature, rainfall, vegetational, ethnographical, religious and population maps, while other parts of the continent are similarly represented by other than purely political maps, *e.g.*, orographical maps of Central Asia and Farther India, product and linguistic maps of India, and an economic map of the Far East. Such a recognition of the broader aspects of geography merits all praise in so inexpensive a publication.]

Pratt's Road Atlas of Scotland and Ireland for Motorists. 44 maps, 12 plans, and profiles. Maps engraved by Geo. Philip & Son. 113 pp. Anglo-American Oil Co., Ltd., London, 1905. 8½ x 5 inches.

[Good automobile atlas with hypsometrical coloring. Roads shown boldly in red. For similar atlas of England and Wales, see *Bull.*, Vol. 44, 1912, p. 800. The use, in such a publication, of the standard colors green, yellow and brown to show relief speaks well for the success the orographical maps of the Edinburgh Geographical Institute have had in educating the British public to a proper appreciation of relief.]

Educational

Black's Diagrammatic Atlas of the British Empire. Expressly designed for the elementary school. By an Elementary Teacher. 33 maps and many diagrams. A. and C. Black, London, 1910. 1s. 9 x 7 inches.

[Boldly drawn diagrammatic maps showing essentials of relief, rainfall, productions, population and communications.]

Atlas der Bijbelsche Aardrijks- en Oudheidkunde. Kaarten geteekend door C. Goote, tekst bewerkt door K. Willemaker. 12 plates of colored maps, 61 pp. of illustrations and 41 pp. of text explanatory of both. G. F. Callenbach, Nijkerk, 1912. Fl. 2.50. 12 x 9 inches.

[A Bible atlas for Dutch schools. Some of the maps are physical. The illustrations cover the whole field of Semitic civilization.]